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LONDON NATURAL HISTORY SOCIETY

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for the year 1972

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with the assistance of
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Contents

Report of the Society for 1972 *

Last year, when reporting a net increase of eight members after several years of falling membership, we refrained from hailing this as a turning point. This year's results, however, a net increase of 54, give us cause to feel well pleased. The totals of paid-up members as at 31 October 1972 are as follows:

Ordinary members	1,008
Affiliated members	23
Senior members	20
Family members	76
Junior members	52
Honorary members	14
Life members	17
	1,210

We record with regret the following deaths during the year: Miss J. F. Bingham. Dr J. D. Carthy. C. P. Castell, Mrs D. Daly, Miss D. W. Fawdry, P. J. McDougal, R. Warburg and Miss I. W. Ward. Obituaries commemorating some of these members are to be published in *The London Naturalist*.

The late C. P. Castell, a past President and an active member until his unfortunate illness in 1967, died in February 1972, leaving the bulk of his estate to the Society. His substantial and valuable library has yet to be examined, but much of it will certainly be added to the Society's library. The future of the remainder of the books will be considered in due time, as will that of the collections of natural history specimens. These include a large collection of bryophytes, some conchological specimens and several hundred microscope slides. We are grateful to A. J. Barrett for housing most of this material and for undertaking to sort and catalogue it, and to Mr and Mrs R. E. Butler (among others) for help in organising the removal of the effects and for housing a certain amount of the material. The financial bequest will be referred to in the Treasurer's report. Suffice it here to say that some £22,000 was received by the end of the Society's financial year.

In last year's report, a guarded reference was made to negotiations for premises. We can now say that we have successfully negotiated an agreement with the authorities of Imperial College for the housing of our Library. As soon as practicable, our books will be deposited on the fourth floor of the Lyon Playfair Library where they will be available to our members subject to our usual library rules. Alongside the agreement covering our Library, but not forming part of it, we have also been able to secure the free use of lecture room facilities

* Presented at the Annual General Meeting, 11 December 1972.

in the Departments of Botany and Zoology of the College. The details are still to be worked out, but we hope soon to begin holding some of our formal meetings at the College. We are grateful to the Librarian, the Professors of Botany and of Zoology and other officials of the College for their generosity, and for the unfailing courtesy which has been extended to us throughout our discussions.

The London Naturalist for 1970 was published early in 1972 and the issue for 1971, though late, is expected to be circulated, together with *The London Bird Report* for 1971, within a matter of days.

We have still not been able to launch the L.N.H.S. Newsletter, which has been on the Council's agenda since early in 1971. Just when we thought the way was clear for a start to be made, Brian Meadows, who had accepted the job of Editor, was posted to Kenya. However, an addressograph machine has been purchased and a small committee has been set up to thrash out the ways and means of producing the Newsletter for issue free to all members about six times a year. Provided an editor can be found and sufficient practical help is forthcoming, we should be able to look forward to the establishment of this new informal publication sometime in the coming months.

The Sections report a successful programme of meetings during the year. Attendances at formal meetings have been maintained (if anything there has been a slight increase in the numbers attending), but we still have pitifully small audiences at many of our lectures. Field meetings have been deservedly popular in spite of a year of indifferent weather. These have included coach trips and weekends, as well as afternoon and full-day excursions.

A number of projects are going forward and members are urged to give them their support. Some of the Sectional Recorders tell us that the numbers of records being submitted seem to be declining. We should all take the little trouble it needs to report what we see to the appropriate Recorders, so that they can build up an overall picture and make their job worthwhile.

Finally we wish to place on record our grateful thanks to the many members and friends who have given so willingly of their time and their services. Such support is an essential part of the Society and with it we can look forward to more successful years in the future.

A Neolithic or Bronze Age Settlement at Laleham

by J. W. Simons

Introduction

In 1956 investigations on the Thames river terraces around Feltham in the London Borough of Hounslow, and Shepperton, Surrey, were commenced by the writer, who paid particular attention to the temporary gravel exposures of the area and to the Pleistocene mammalian remains that were occasionally obtained from them.* Repeated visits to many gravel-pits in the vicinity resulted not only in the acquisition of many Pleistocene remains but also some of post-Pleistocene date, the most notable being fragmentary human remains, a Neolithic hammer-head, cut deer antlers and butchered bones of domestic animals from what is probably a river-side settlement at the gravel workings of W. J. Lavender Ltd. between Shepperton and Chertsey.

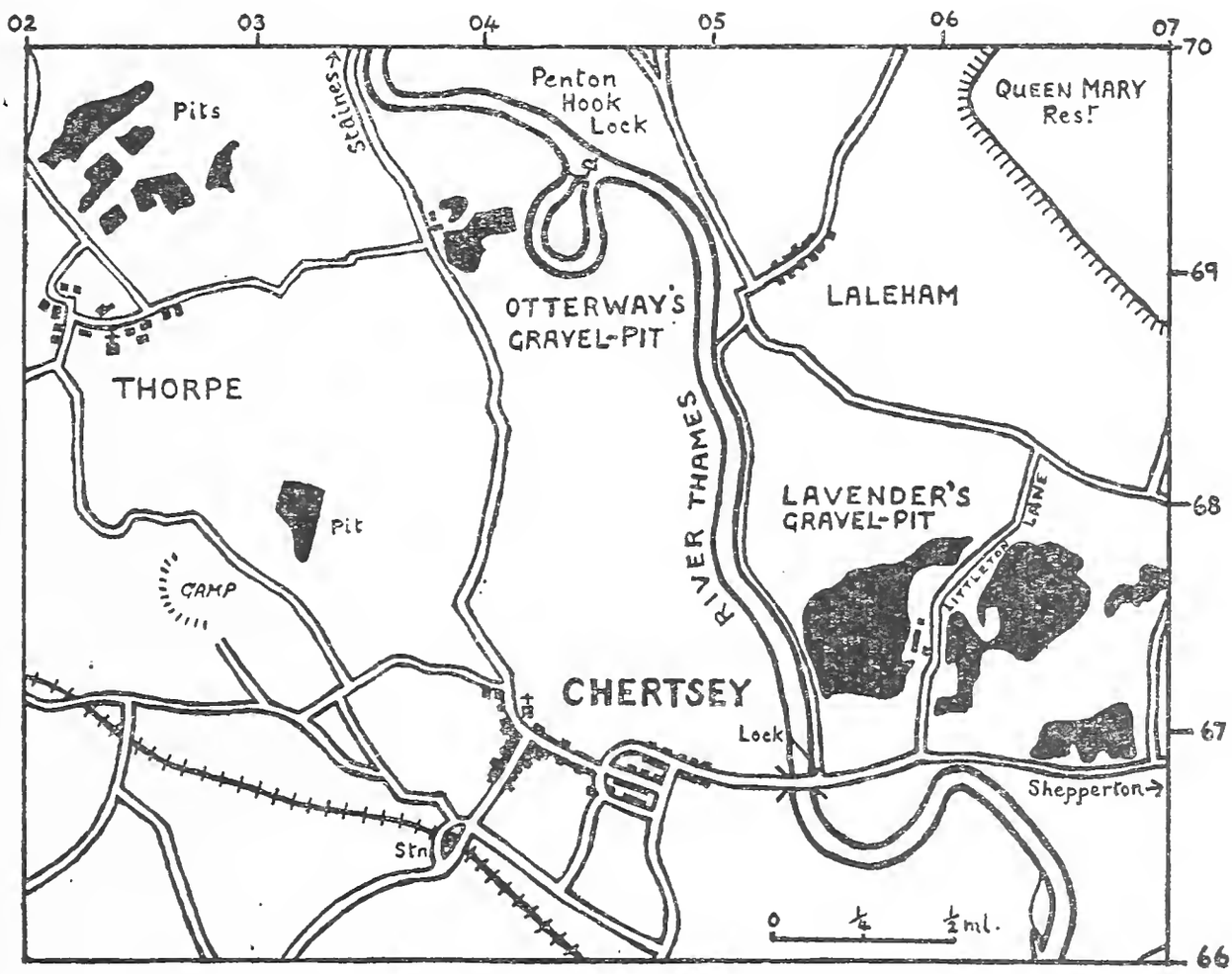

Fig. 1. The location of Lavender's pit and other gravel workings near Chertsey.

Lavender's pit (TQ 057675) lies south of the Shepperton Road between here and the River Thames in the parish of Laleham. (Fig. 1). It is separated from the latter only by a balk of unexcavated

* A full report of these investigations is in preparation and will be published in due course.

material along which runs the tow-path from Chertsey Bridge to Penton Hook Lock. The pit is flooded owing to its close proximity with the River so that only a small part of the earlier fluviatile deposits are visible above water-level.

The Section

Since bore-hole data were not available and it was not possible to obtain any measured sections of the deposits owing to the dangerous nature of the sides of the pit at the time of investigation, only a tentative note on the stratigraphy can be given.

On the western side of the pit approximately five to six feet of light-coloured water-laid sands and gravels, overlain by soils, were exposed above water-level. These contained an abundance of freshwater molluscs of the genera *Bithynia*, *Discus*, *Hygromia*, *Limnaea*, *Theodoxus* and *Valvata*, and rested on what in all probability is an aggregation surface of earlier Pleistocene gravels appearing at water-level. A Pleistocene river terrace is indicated by the presence of a very broken tooth of mammoth, *Mammuthus primigenius*, and an antler base of reindeer, *Rangifer tarandus*, dredged from the pit.

At the north-western corner of the workings a bed of peat apparently lies beneath the Holocene sands and gravels and channelled into the surface of the Pleistocene terrace. It lies below present water-level and could not be examined in situ. However, since the peat hinders gravel sorting at the washing plant, the company dredged this area and quantities of peat were dumped on the surface. On one visit the writer, accompanied by the late A. G. Davies, was able therefore to collect a few nuts and seeds from it as well as a dog vertebra. Wood fragments, leaf impressions, small balls of vivianite (hydrous iron phosphate $Fe_3(PO_4)_2 \cdot 8H_2O$) and an amount of grey plastic peaty clay were also found. The peat stratum is by far

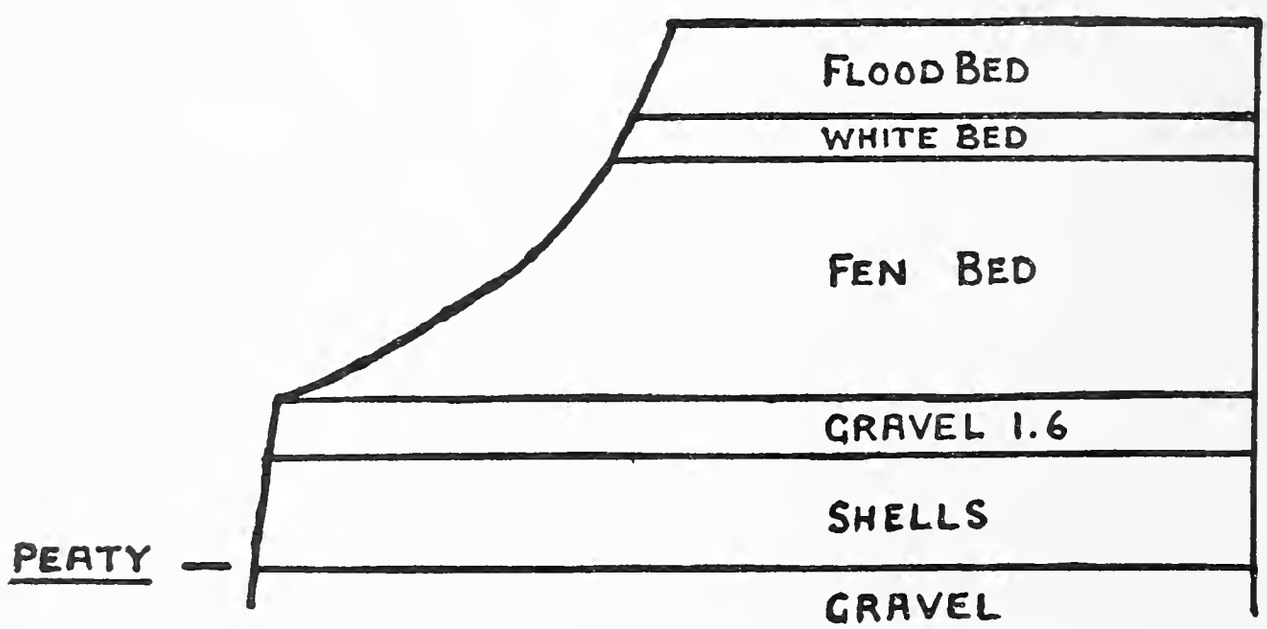

FIG. 2. Rough section of Holocene deposits at Otterway's pit, drawn by the late A. G. Davies, 1956 (unpublished notebook); note the peaty layer.

the most significant in the section, since it is probably from this that most of the remains (described below) were dredged.

Similar sequences of Holocene shell-bearing deposits have been recorded a few miles upstream, at Penton Hook Lock (Cooper 1922) and at Otterway's gravel-pit (Howard 1952). A rough section of an exposure in Otterway's pit was drawn by the late A. G. Davies in his notebook in 1956 and is reproduced here (Fig. 2). A peaty layer was also found at the base of this sequence resting upon Pleistocene gravels. Mr Davies (verbal communication) also informed the writer that a peat-bed containing bones lay beneath river-level on the north bank of the Thames at Penton Hook Lock, and that he was of the opinion that the peat-beds exposed in the gravel-pits and river sections were part of one large riverside bog extending from Lavender's pit to gravel-pits about one mile north of Thorpe village.

The Collection of Human, Animal and other Remains

Although it is probable that there is an admixture of remains from different stratigraphic levels in this collection from Lavender's pit, owing to winning gravel by the dredging method, the assemblage will here be considered as a unit, since the bulk of the remains are of similar preservation and some are stained with blue vivianite indicating that they may have been derived from the peat-bed. The following remains were skilfully extracted at the washing plant by a company workman, Mr Salmon, and also collected from his spoil-heap of unwanted peat and clay by the writer and Mr D. Idle. The

TABLE 1. Mammalian remains from Lavender's pit.

	Number of specimens	Approximate percentage of grand total of specimens	Relative order of abundance	Wild species	Domesticated species	Evidence for use as food (butchering)
Man	3	1·4	VII	—	—	—
Wolf or dog (large-domestic)	8	3·7	V	?	?	—
Dog (domestic)	11	5·1	IV	—	x	—
Fox	2	0·9	VIII	x	—	—
Pine marten	1	0·5	IX	x	—	—
Badger	1	0·5	IX	x	—	—
Horse (domestic?)	36	16·7	III	?	?	—
Pig (domestic?)	5	2·3	VI	?	?	x
Sheep (domestic) and/or goat (domestic)	62	28·8	I	—	x	x
Red deer	24	11·2	IV	x	—	x
Giant ox or Neolithic ox (domestic)	3	1·4	VII	?	?	?
Ox (domestic)	60	27·9	II	—	x	x
Total:	215					

collection is now preserved in the mammal section of the Zoology Department of the British Museum (Natural History). A summary of the numbers of specimens and relative abundance of each species of mammal represented in the collection is given in Table 1.

1. MAN *Homo sapiens* L.

Human remains are represented by only three specimens, a fragment of parietal which is very thin and may belong to a juvenile, part of a left frontal with the brow-ridge which had grey peaty clay adhering to it when found, and a left os innominatum of the pelvis which, judging from the width of the sciatic notch, probably belonged to a woman. The presence of man is, however, further indicated by other items dredged from the pit, namely, a beautifully made hammer-head of green igneous rock which has a perfectly circular hole drilled through it and shows signs of usage (Plate 1), cut antlers of red deer (see below), shells of the oyster, *Ostrea edulis* L., and butchered bones of domestic animals representing food debris. The writer was also informed by the workmen that from time to time large pointed wooden stakes were also dredged from the pit. Of particular importance is the hammer-head which is of a typical Neolithic form and the worked antlers that are also suggestive of Neolithic times.

2. WOLF *Canis lupus* L. or DOG (large-domestic)

There are eight specimens referable to wolf or very large dog—a right third metacarpal (length 86 mm), a left third metatarsal (length 77 mm), one cervical vertebra of very large size, one smaller thoracic vertebra; two right ossa innominata, one large (length 169 mm) and one smaller (length 154 mm); two right femora, one larger than the other, which could articulate with the pelvic bones (lengths 252 mm : 221.5 mm). Bones of at least two individuals are present, one of very large size (femur length 252 mm) and one of average size.

3. DOG *Canis* (domestic)

Remains of medium-sized dogs are represented by three skulls, one with a short wide facial region, the largest of which is battered and seems to have suffered a killing blow; one left mandibular ramus with no teeth and four right mandibular rami with incomplete dentitions, the proximal end of a right radius, a right tibia and a lumbar vertebra. The latter was collected from within lumps of peat thrown onto the north-western side of the pit.

4. FOX *Vulpes vulpes* (L.)

Represented by a left femur and a right radius.

PLATE 1. Neolithic hammer-head of green igneous rock from Lavender's pit. Front, side, abraded bottom and top views.

PLATE 2. Cut antlers of red deer from Lavender's pit.
Copyright British Museum (Natural History)

5. ? PINE-MARTEN *Martes martes* (L.)

A right tibia, originally identified as cat by the writer, has tentatively been referred to pine-marten by Dr J. Clutton-Brock.

6. BADGER *Meles meles* (L.)

One incomplete skull.

7. HORSE *Equus* (domestic?)

Horse is represented by thirty-six specimens. Jaw fragments and teeth comprise a mandible with a nearly complete dentition, a fragment of right ascending ramus with M_3, a right upper molar and two left upper molars. From the fore-limb there is an incomplete right scapula, the distal end of a right humerus, a right radius with fused ulna and four metacarpals, one lacking epiphyses. Bones of the hind-limb include a shaft of a left femur, two complete right tibiae (one lacking the proximal epiphysis), two distal ends of left tibiae, a left metatarsal lacking the distal epiphysis and a third metatarsal lacking both epiphyses. There are also two first phalanges and fifteen assorted vertebrae. The bones lacking the epiphyses are from juvenile animals.

8. PIG *Sus scrofa* L. (domestic?)

Pig bones include a complete adult palate with maxillae, a left humerus lacking epiphyses, an arthritic left tibia with no proximal epiphysis and two distal ends of right femora both lacking distal epiphyses. The presence of young animals, as shown by the loss of the epiphyses, and the fact that two femora have been butchered indicate that this species was used for food. One femur end has a deposit of vivianite on it.

9. SHEEP *Ovis* (domestic) and/or GOAT *Capra* (domestic)

Both species are probably represented. There are two incomplete crania, a maxilla and a horn-core from adult sheep, six left mandibular rami and four right mandibular rami of both adult and juvenile animals, a left ascending ramus that has been butchered, five right and four left scapulae (adult and juvenile), one right humerus lacking the proximal epiphysis (young), three distal ends of left and right humeri (adult), one radius (adult), three metacarpals (adult), six osa innominata of the pelvis of which two left acetabulae show signs of having been butchered, five femora, ten tibiae and six vertebrae from both adult and juvenile animals, and four metatarsals, one of which is from a very large sheep.

10. Red deer *Cervus elaphus* L.

This wild forest species is represented by a complete set of antlers with the frontals attached, seven naturally shed antlers from different individuals, a portion of an antler beam, a shaft of a right humerus (juvenile), two proximal ends of right radii (adult/juvenile), a shaft of a right metacarpal (juvenile), the proximal end of a left femur (juvenile), a right tibia lacking the proximal epiphysis (juvenile), a distal end of a right tibia (adult), an incomplete left os innominatum of the pelvis, a proximal end of a left metatarsal and the distal end of a metatarsal (one chopped), an atlas vertebra, a thoracic vertebra lacking epiphyses, a lumbar and a last lumbar vertebra. At least nine individuals are present. These remains of red deer form the most interesting part of the mammalian assemblage since four of the antlers show signs of human workmanship (see below).

11. Giant ox *Bos primigenius* Bojanus or neolithic ox (domestic)

Ox is represented by three fragments of horn-core from the skulls of very large animals. Two of these are actually horn-core tips, each piece being approximately a foot long, of large diameter and possessing a double curvature. They strikingly resemble the long double-curved horns of the extinct giant ox or aurochs *B. primigenius*, an animal standing some six feet at the shoulder with a horn span reaching up to four feet. This animal survived from Pleistocene times, when it was common during Interglacial phases, to the close of the Bronze Age in England, though may have survived later in the Highlands of Scotland (Banks 1962). Domestic cattle are presumed to be descended from this wild species.

In considering the correct identification of the above horn-core fragments it is important to note that the skulls and skeletal material of domesticated Neolithic cattle are, except by being smaller in proportion, indistinguishable from their Pleistocene ancestors, and it is believed that continual interbreeding between the domestic and wild forms was probably responsible (Cole 1959 : 25). The Neolithic breed can easily be distinguished, however, from the much smaller short-horned domestic variety which replaced it in Bronze Age times. The horn-core fragments are too large to have belonged to the Bronze Age variety and, therefore, must have come from either the wild or the Neolithic domestic ox, although all the preserved ox limb-bone material tends to rule out the presence of *Bos primigenius* on size.

12. Ox *Bos* (domestic)

Domestic cattle bones are represented by sixty specimens as follows:

Skull and mandible: the occipital condyles from two skulls, a fragment of left maxilla with M_2, a right mandibular ramus with M_2—M_3, a portion of right mandibular ramus with no teeth, a right ascending ramus of a mandible and a left mandibular ramus with no teeth.

Fore-limb: four incomplete right scapulae, a distal end of a right humerus, a portion of the proximal end of a humerus, a complete right radius, an incomplete right radius, two incomplete left ulnae, an incomplete right ulna, a complete left metacarpal (length 217 mm), an imperfect left metacarpal and two left metacarpals lacking their distal epiphyses.

Hind-limb: a fragment of a right os innominatum of pelvis, two right acetabula of pelves one of which is butchered, a proximal end of a right femur, three distal ends of left femora one without its distal epiphysis and one much stained with vivianite, an incomplete left tibia, a left tibia lacking its proximal epiphysis, an incomplete right tibia, three distal ends of right tibiae, two left calcanea, one right calcaneum, a right navicular-cuboid, one complete right metatarsal (length 239 mm), three right metatarsals lacking their distal epiphyses, and one metatarsal also lacking its distal epiphysis.

Vertebrae: one portion of an axis, two cervicals, a thoracic, nine lumbar (four of which are halves, the vertebrae having been cut antero-posteriorly), and a portion of sacrum.

Toe-bones: two first phalanges only.

A minimum number of four adult animals and three juveniles can be recognised in this assemblage though the actual numbers of individuals is probably much greater, since it is unlikely that many of the bones are associated. Chopping marks again show use as food.

13. Indeterminate mammalian remains

There is a portion of vertebra and three neural spines of vertebrae which all show signs of butchering, and thirteen ribs, of which ten have been butchered; these cannot be reliably identified.

14. Bird remains

Represented by four parts of skeleton of which a carpo-metacarpus can be referred to the mute swan, *Cygnus olor*.

15. Plant remains

A number of hazel nuts, *Corylus avellana* L., and several other unidentified seeds were collected from peat thrown onto the side of the Pit.

The Cut Deer Antlers

Four red deer antlers show signs of human workmanship as follows (Plate 2):

A. A slender, incomplete, antler that has a cut and hollowed area immediately above the burr in the position of the brow-tine.

B. An antler base, naturally shed, with brow and bez-tines diverging immediately above the burr (a typical feature of red deer), the beam of which has been cut above the tines so as to form a v-shaped notch around its circumference.

C. A very stout naturally shed, antler with the brow-tine sawn off by a metal saw or rasp at about one inch from its junction with the beam.

D. Part of an antler beam, bearing the trez-tine, that has been completely severed from the base of the antler. The cut is part of a v-shaped notch, which gives the specimen the appearance of being rounded, and seems to be a further advanced stage of the same condition exhibited by specimen B.

In Neolithic times red deer antlers were commonly used for digging and flint mining, such as at Grime's Graves, Norfolk, and at Church Hill, Findon, Sussex, and for hafts and sleeves for flint and polished stone axes used in felling trees for timber palisades, buildings etc. It seems unlikely that the Lavender's pit specimens were intended for mining purposes since usually all but the brow-tines were removed so as to leave a suitable pick-head. It is more probably that they were intended for the latter use, in fact it is quite possible that the specimen A with the hollowed area above the burr was a haft for a small axe. It is believed that the elasticity of antlers made them less likely to split when the implement was in use. Specimen C has the brow-tine sawn off suggesting that it is of younger date, perhaps Bronze age or even younger, when metal implements had become available.

Conclusions

In the above account it has been suggested that the peat-bed known to be present at the base of the Holocene sequence of deposits at Lavender's pit is the most likely source of many of the dredged remains. This evidence is as follows:

1. The peat-bed is known to contain bones of domesticated animals, viz. a dog vertebra collected from peat thrown onto the side of the pit.

2. There are in the collection bones stained with vivianite (e.g. ox, pig), which is often associated with peat deposits and known to occur within the peat of Lavender's pit.
3. Most of the remains are of similar preservation.
4 Man's presence at the time of the accumulation of the peat-bed is indicated by pointed wooden stakes dredged from the pit, the wood of which is only likely to have been so well preserved because it had been interred in a waterlogged marsh. Part of a human frontal bone also had grey peaty clay adhering to it and may have been derived from this stratum.

What then is the age of the peat-bed and the finds? In the first instance it has been established that the peat-bed, a riverine marsh but not specifically water-laid, immediately overlies a Pleistocene terrace of the River Thames and is in turn overlain by a reasonable thickness of floodplain river-deposited shell-bearing sands and gravels. Since the area immediately adjacent to the river must have been considerably waterlogged in order to allow the formation of the peat-bed and the stratum is now submerged below present water-level, it can be assumed that the river-level was slightly lower than at present. The overlying shell-bearing deposits show a subsequent rise in river-level which finally receded to that of the present time. It can be argued therefore that the position of the peat-bed in the sequence suggests an early date following the close of the Pleistocene period, when dense forests are known to have covered a considerable part of Europe on the retreat of the Ice Age glaciers.

In the absence of any other reliably identifiable material there is in the collection a number of items that provide more precise information as to age. These are the Neolithic hammer-head, the cut deer antler (excepting that which has been sawn) suggestive of Neolithic times, and the presence of either *Bos primigenius* (known to have become extinct in the south of England by the close of the Bronze Age) or the large, similar, domesticated breed derived from this wild species in the Neolithic and which was replaced in the Bronze Age by a much smaller domesticated variety of cattle. All present available evidence suggests, therefore, that the peat-bed is early Holocene and that the remains, most of which have presumably been dredged from this horizon, are probably of Neolithic or, at the latest, Bronze Age date.

That there was a human settlement at the time of the accumulation of the peat-bed is indicated by the occurrence of the pointed wooden stakes which were perhaps from timber buildings or a palisade. Neolithic peoples are known to have founded settlements, often with houses built upon stilts as a protection against floods, on lake sides, as at Aichbühl, Württenburg, Switzerland (see Cole 1959 : 49). A settlement along the banks of a former course of the River Thames or on the edges of a river-side marsh at Lavender's pit is further indicated, not only by the remains of man himself and his artefacts,

but by numerous remains of his domesticated animals, many of which he bred and used for food (e.g. pig, sheep or goats, and cattle). In the mammalian collection the most abundant recognisably wild species represented is red deer. Although it can be certain that this animal would have been hunted for venison, since Neolithic and Bronze Age peoples possessed the means as shown by the various types of flint arrow heads obtained from sites of these periods, the bulk of the remains of this animal are naturally shed antlers which shows that it was not always necessary to hunt in order to obtain materials for hafting axes.

The conclusion on dating is further substantiated by the occurrence, a few miles upstream in Otterway's gravel-pit, of a similar sequence of deposits, with a peat-bed, also reported to contain settlements of Neolithic and Iron Age, excavated by Professor W. F. Grimes (unpublished, but see Howard 1952). Skulls of *Bos primigenius* and/or the domesticated Neolithic breed have also been dredged from gravel-pits just north of Thorpe village. In the writer's opinion it would be particularly rewarding if further archaeological excavations were to be conducted in the area to determine the full extent of the peat-bog and the exact nature of the surrounding settlements, but infiltration by river-water would prevent extensive excavations unless aided by mechanical pumps.

APPENDIX

Archaeological Items from Neighbouring Gravel-pits

A few specimens were collected by the writer from other gravel-pits in the Feltham and Shepperton areas and, though less significant than the remains obtained from Lavender's pit, are recorded here. The writer wishes to acknowledge the kind assistance of the managers of these other workings.

Hall & Co.'s pit, Watersplash Road, Lower Halliford, Shepperton (TQ 093670)

Bones of a small ox, large deer and dog were obtained from this pit. Only a few visits were paid so it is possible that more material has since come to light. A large collection of human and other remains, possibly of Bronze or Iron Age date, was dredged from the River Thames during the construction of the Sunbury Lock only two miles downstream; this material is preserved in Kingston-upon-Thames museum.

Charlton's pit, New Road, Sunbury (TQ 080687)

A skull, comprising the horn-cores and frontal bones, of the small Bronze or Iron Age domestic ox, a left radius, femur and metatarsal

and a right os innominatum of the pelvis of a small ox; a metatarsal of horse and a fragment of a left frontal bone and parietal of a sheep or goat.

Greenham's pit, Chertsey Road, Feltham (TQ 090715)

A distal end of an ox femur and a metatarsal and tibia of horse.

Hall & Co.'s pit, Clockhouse Lane, Feltham (TQ 077725)

A perfect Middle Bronze Age metal palstave was dredged from this pit and presented, through the writer, to the London Museum in June 1960. The following note on the specimen was received from that Museum: "Unlooped, low-flanged palstave, showing developed, undercut (overhanging) stop which is unusual in this early form. Low-flanged palstaves are typical of the south eastern bronze industries of the period c. 1300-1000 B.C. but possibly survive later".

The writer expresses his gratitude to W. J. Lavender Ltd. for permitting access to their Littleton Lane workings and enabling the collection of dredged specimens to be made, in particular to Mr Parrot (then Manager) and Mr Salmon whose skill on the washing-plant resulted in the collection of some of the better preserved material including the hammer-head; and to Mr D. Idle who accompanied the writer on excursions and collected many specimens from the spoil-heap.

Assistance from members of staff of the British Museum (Natural History) is gratefully acknowledged: Dr A. J. Sutcliffe for a preliminary identification of the mammalian remains, Dr K. P. Oakley for identification of human remains, the late Mr C. P. Castell for identification of freshwater molluscs, Mr R. Banks for checking references. In addition, the writer is indebted by Dr J. Clutton-Brock for reading and commenting on this paper etc., and the Director for providing and permitting publication of the photograph of the red deer antlers (Plate 2).

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London Clay Fossils from Wraysbury Reservoir, Stanwell, Surrey

by JOHN COOPER

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Abstract

In 1968 the construction of a new reservoir for the Metropolitan Water Board on the border of Buckinghamshire and Surrey near Wraysbury, Buckinghamshire, provided an opportunity to collect London Clay (Eocene: Ypresian) fossils from the large surface exposures produced in the excavation. In addition, fossil logs with associated detrital concentrates were discovered and removed for laboratory processing. The biota of hand-picked fossils and those processed from 319 kg dry weight of clay from around the logs is listed, and compared with lists from nearby sites (King George VI Reservoir (Stanwell), Wrigley 1940; London Airport (London Borough of Hillingdon), Rundle & Cooper 1970). The London Clay at Wraysbury is assigned to Division 3 of Wrigley (1924 & 1940).

Introduction

On 4 May 1968 the Geologists' Association held a field meeting at Wraysbury Reservoir, which the writer attended as a guest. Before visiting the site, introductory talks were given by Mr S. C. A. Holmes of the Institute of Geological Sciences and by Mr P. Cooley, Resident Engineer of John Laing and Son Ltd. The reservoir was then visited and the construction methods explained. In the afternoon, some of the party visited one of the intake tunnels (Shaft no. 6) in Moor Lane, Staines, at TQ 030742.

Following this visit, the fossiliferous nature of the London Clay there was thought worthy of further attention, and between May and June 1968 further visits were made by members of the staff of the Department of Palaeontology, British Museum (Natural History) and Dr A. J. Rundle. The names of all those helping are gratefully recorded in the acknowledgements. During the visits, many fossils were hand-picked in the field from the dry, weathered surfaces and clay samples totalling 319 kg dry weight were taken. All the fossils and samples were taken from the floor and up to 2 m above the base of the "borrow-pit", 32 ft OD at about TQ 025752 in the northern end of the Reservoir. Most of the clay samples came from the "blue ground" around fossil logs, which had acted as traps or current-decelerators on the ancient sea floor thus accumulating many organic remains, usually so sparsely scattered in the main mass of the clay. The physical properties of the London Clay in the borrow-pit have been dealt with by Skempton *et al.* 1969. A representative series of fossils from Wraysbury and Shaft no. 6 has been deposited in the Department of Palaeontology, British Museum (Natural History).

The site details are set out in the style of Rundle & Cooper (1970) for direct comparison and easy information retrieval. Following the

fossil names in the lists are the numbers or estimates of frequency of the specimens and their known range in the London Area in terms of faunal Divisions (1-5) based on Wrigley (1924 & 1940) and Rundle & Cooper (1970), with modifications based on the evidence of material in the British Museum (Natural History).

The Sites

1. WRAYSBURY RESERVOIR, STANWELL, SURREY

LOCALITY: borrow pit, Wraysbury Reservoir site, Stanwell, Surrey.

GRID REFERENCE: TQ 025752 HEIGHT (O.D.): 32 ft on floor of borrow pit, approx. 60 ft outside Reservoir.

CONTRACTORS: John Laing & Son Ltd.

REPORTED BY: H. A. Toombs (from *Geologists' Association Circular* **701:** 11 (March 1968)).

COLLECTORS: J. C., C. I. Macadie, Miss B. East, C. P. Nuttall, R. H. Bate and A. J. Rundle (4 May 1968-14 June 1968).

SECTION:

		m	ft
Alluvium Upper Flood Plain Terrace Gravels	variable	3·05—9·3	(10—30)
London Clay		1·83	(c. 6)
Claystone band		0·30	(1)
London Clay		4·90	(16)
Claystone band (floor of borrow pit)		0·30	(1)
London Clay (not visible)		c. 32·20	(c. 106)

Borings by the Metropolitan Water Board (Skempton *et al.* 1969: 209) showed the London Clay to be about 130 ft (39·6 m) thick in the district.

LITHOLOGY OF LONDON CLAY: Typical stiff grey greasy clay, weathering rapidly to a dull brown. Large numbers of branches and logs exposed in the working-faces cut by the wheel-excavator.

BIOTIC LIST: Based on hand-picked fossils in the field and from a residue of 13·05 kg of fossils and debris processed from a 319 kg dry weight sample of clay from around the logs.

	Number	Range
PLANTAE		
Indeterminate wood fragments	Common	2—5
Copaline ("Highgate Resin")	2 lumps	3—5
Indeterminate seed	1	—
PROTOZOA		
A few forms, broadly referable to the genera *Lenticulina*, *Nodosaria* and *Marginulina*	23	2—5

	Number	Range
BRYOZOA		
Batopora clithridiata (Gregory)	46	2—5
Abundant undetermined bryozoans		
COELENTERATA		
Graphularia wetherelli Milne-Edwards	41 (square form only)	2—5
BRACHIOPODA		
Lingula tenuis J. Sowerby	1 fragment	2—5
Terebratulina wardenensis Elliott	3	2—3
BIVALVIA		
Abra splendens (J. de C. Sowerby)	11	2—5
Anomia scabrosa S. V. Wood	26	2—4
"*Arca*" *tumescens* Wood	5	3
Corbula globosa J. Sowerby	1	2—5
Cuspidaria inflata (J. de C. Sowerby)	1	3—5
C. triradiata Wrigley	4	3
"*Glycymeris*" *wrigleyi* Curry	7	2—5
Nemocardium nitens (J. Sowerby)	7	3—5
Nucula bowerbanki J. de C. Sowerby	10	2—5
N. (*Nucula*) *consors* Wood	29	3—5
Nuculana amygdaloides (J. de C. Sowerby)	17	2—5
Pycnodonte [*Ostrea*] *gryphovicina* (S. V. Wood)	2	3—5
Pholadomya (*Bucardiomya*) *margaritacea* (J. Sowerby)	8	3—5
Pinna affinis J. Sowerby	3	2—5
?*Pitar sulcatarius* (Deshayes)	1 fragment	2—5
Pteria papyracea (J. de C. Sowerby)	3 + common fragments	2—5
Teredinid tubes and pallets	common	2—5
Thyasira angulata (J. Sowerby)	7	2—3
T. goodhalli (J. de C. Sowerby)	10	2—5
Verticordia sulcata (J. Sowerby)	2	2—3
GASTROPODA		
Acrilla or *Mathilda sp.*	1	—
Actaeon sp. (not *Crenilabium*)	1	2—5
Aporrhais sowerbii (Fleming)	13	3—5
Bonellitia sp.	2	2—5
Bullinella cf. *consors* (Deshayes)	6	2—5
Coptostoma sp.	1 not prev'sly recorded from the London Clay	

	Number	Range
Epitonium undosum (J. de C. Sowerby)	2	3
Euspira glaucinoides (J. Sowerby)	27	2—5
Ficus (*Priscoficus*) *londini* Wrigley	21	2—4
?*Fusinus wetherelli* Wrigley	1	3—5
Hemipleurotoma spp.	9	3—5
Orthochetus elongatus Wrigley	4	2—4
Patella sp. (see Wrigley 1924: 259)	4	2—4
Pseudotoma [*Pisania*] *obliquicostata* (Edwards MS)	1	3
Ptychatractus interruptus (Pilkington)	1	3—5
Sassia morrisi Wrigley	2	3—5
Scaphander aff. *parisiensis* d'Orbigny	1	2—5
Scaphella wetherelli (J. de C. Sowerby)	2	3
Siphonalia ferroviae Wrigley	1	3
Solariaxis pulcher (J. de C. Sowerby)	3	2—5
?*Streptolathyrus cymatodis* (Edwards)	12	2—3
Tibia sublucida (Edwards)	1	3—4
Tornatellaea simulata (Solander)	1	3—5
Turricula teretrium (Edwards)	12	3—5
Turritella sp. aff. *dixoni* Deshayes	1	5
PTEROPODA		
Spiratella mercinensis (Watelet & Lefèvre)	22	2—5
S. taylori Curry	72	2—5
SCAPHOPODA		
Antalis anceps (J. de C. Sowerby)	45	2—3
"*Antalis*" *nitens* (J. Sowerby)	7	2—5
CEPHALOPODA		
Indeterminte nautiloid	1	2—5
? nautiloid protoconch	1	—
ANNELIDA		
Ditrupa plana (J. Sowerby)	common	2—5
Sclerostyla ? *gallica* Wrigley	13	2, 4—5
?epizootic worms on *Cainocrinus*	several	—
ARTHROPODA		
Arcoscalpellum quadratum (Dixon)	34	2—3
Hoploparia gammaroides M'Coy	2	2—5
Linuparus ?*scyllariformis* (Bell)	antenna fragment	2—5
mandibles of crab or lobster	5	—
crab pincers, indeterminate	15	2—5
ostracod, undetermined	1	2—5

		Number	Range
ECHINODERMATA			
Amphorometra ornata Rasmussen		6 (includes the holotype)	3
Cainocrinus tintinnabulum Forbes		common	2—5
?"teeth" of regular echinoids		17	—
Lophidiaster concavus Rasmussen		5 (includes the holotype)	2—3
PISCES (kindly named by Messrs J. G. Maisey and D. J. Ward)			
?*Callorhynchus* sp.	fin spine	1	Woolwich Bottom Bed (Lr. Eocene)
Isistius trituratus Winkler		1	3—4
Lamna affinis Casier		2	3—5
"*Lamna*" *verticalis* Agassiz		1	2—5
Scyliorhinus biauriculatus Casier		9	3
S. minutissimus (Winkler)		2	3—5
Squalus minor (Leriche)		5	2—3
?*Squalus* sp.	fin spine	1	—
Squatina prima (Winkler)		1	3
Indeterminate teleost bones		frequent	2—5
(represented only by otoliths: determined by Messrs F. C. Stinton, K. Hackett and Dr A. J. Rundle).			
Ampheristus toliapicus König		4	2—5
Apogon glaber Stinton		1	2—5
?*Argentina extenuata* Stinton		4	3
Brosmophycis sagittalis (Frost)		2	2—5
Dinematichthys argutus Stinton		73	2—5
Ditrema sheppeyensis (Frost)		23	3—5
Hypomesus pennatus Stinton		23	3—5
Microgadus eocenicus (Frost)		377	2—4
?*Molva dubia* Stinton		1	—
Neobithytes obtusus (Frost)		c. 400	2—5
Palaeogadus serratus Stinton		8	2—5
Paralabrax tenuicauda Stinton		2	2—5
Pterothrissus angulatus Stinton		3	2—5
?*Raniceps papillosus* Stinton		3	3
Spicara minsterensis (Frost)		36	2—5
Synodus davisi (Frost)		39	2—5
Trachichthodes lemoinei (Priem)		96	2—5
Uroconger validus Stinton		30	2—4
Undetermined otoliths (mostly *Microgadus eocenicus*)		c. 500	—
ICHNOFAUNA			
Indeterminate burrows		common	—
Indeterminate faecal pellets		10	2—4

2. WRAYSBURY TUNNEL

LOCALITY: shaft 42·75 m (140 ft) deep and tunnel, Moor Lane, Staines, Surrey.

GRID REFERENCE: TQ 030742 (at shaft) HEIGHT (O.D.) c. 60 ft

CONTRACTORS: Kinnear Moodie & Co. Ltd.

COLLECTORS: J. C. (4 May 1968), J. C., C. I. Macadie and A. J. Rundle (14 June 1968).

SECTION: none available. At Stanwell (King George VI) Reservoir about 1 km to the S.E., the section (Wrigley 1940: 232) below a surface at 55 ft O.D. was:

Gravel		5·5 m	(18 ft)
London Clay	exposed for about	14·0 m	(46 ft) with two horizontal planes of septaria about halfway down. The clay in the reservoir was about 61·0 m (200 ft) above the base of the London Clay.

The clay on the tip came from underneath King George VI Reservoir, Stanwell, at about —23·8 to —25·0 m (—78 to —82 ft) below O.D., therefore the clay came from about 18·3 m (60 ft) above the base of the London Clay placing it within Division 2.

LITHOLOGY OF LONDON CLAY: hard brownish clay with slickensided surfaces. Pebbles of flint fairly common along the length of the tunnel.

BIOTIC LIST: based on a few hand-picked fossils from the tip and the residue from about 40 kg dry weight of clay.

	Number	Range
PLANTAE		
Indeterminate wood	1 twig and part of log	2—5
PROTOZOA		
A few forms, broadly referable to the genera *Lenticulina* and *Quinqueloculina*	22	2—5
COELENTERATA		
Graphularia wetherelli Milne-Edwards	27 (square form only)	2—5
BRACHIOPODA		
Lingula tenuis J. Sowerby	5	2—5
BIVALVIA		
?*Abra splendens* (J. de C. Sowerby)	1	2—5
Anomia scabrosa S. V. Wood	3	2—4
Arctica planata (J. de C. Sowerby)	2	3—4

	Number	Range
Corbula cf. *clarendonensis* Wrigley	1	3—4
Pecten duplicatus J. de C. Sowerby	7	2—5
Pinna affinis J. Sowerby	2	2—5
Thracia sp., probably *T. oblata* (J. de C. Sowerby)	1	3—4
GASTROPODA		
Alvania sp. (resembling *Turboella misera* (Deshayes))	1	2—4
Calyptraea aff. *aperta* (Solander)	1	3—5
Euspira glaucinoides (J. Sowerby)	1	2—5
?*Euthriofusus* sp.	1	—
Solariaxis pulcher (J. de C. Sowerby)	1	2—5
PTEROPODA		
Spiratella mercinensis (Watelet & Lefèvre)	1	2—5
ANNELIDA		
Ditrupa plana (J. Sowerby)	7	2—5
Undetermined annelid jaws (scolecodonts)	1	2—5
ARTHROPODA		
Undetermined ostracods	4	2—5
ECHINODERMATA		
Cainocrinus tintinnabulum Forbes	4	2—5
Ophiuroid ossicles, undetermined	3	—
PISCES (determined by Mr D. J. Ward)		
Squalus minor (Leriche)	1	2—3
Striatolamia macrota (Agassiz)	15 fragments	2—5
Indeterminate teleost vertebrae (represented only by otoliths: determined by Dr A. J. Rundle and Mr K. Hackett)	3	2—5
Neobythites obtusus (Frost)	2	2—5
Raniceps papillosus Stinton	2	3
Uroconger validus Stinton	1	2—4
ICHNOFAUNA		
Indeterminate faecal pellets	1	2—4
Spherical object, 0·30 mm diameter	1	1
INORGANIC MATERIAL		
Flint pebbles associated with log	4	—

Discussion

The biota from Wraysbury Reservoir can be compared with those from Stanwell (King George VI) Reservoir (Wrigley 1940) and London Airport (Rundle & Cooper 1970: 122-123). All three sites have a biota typical of faunal division 3 of the London Clay in the London Area (Wrigley 1924 & 1940). It would be interesting to know whether the two septaria courses seen in Wraysbury (this paper) and Stanwell Reservoirs (Wrigley 1940: 231) were in fact parts of the same horizons: these claystone bands are thought to be discontinuous but may be of local use in correlation. Unfortunately Wrigley (1940) gives no further details of them; knowledge of the vertical distance between each would have been useful.

The Wraysbury Tunnel biota came from below King George VI Reservoir at Stanwell, at about —23·8 to —25·0 m (—78 to —82 ft) below O.D. The London Clay is about 61·0 m (200 ft) thick here, and this would place the clay from the tunnel at about 18·3 m (60 ft) above the base of the clay, i.e. in the lower part of Division 2. Flint pebbles were frequently encountered during the tunnelling and one log had several associated with it.

Surface exposures of Division 3 London Clay do not extend very far west of Staines, for at Bracknell, Berkshire, Division 4 clay is present, presumably overlying Division 3 London Clay. Farther west than Bracknell, in the Reading area, Wrigley's faunal divisions no longer hold good: clay and sandy clays equivalent in time to Divisions 4 and 5 occur, but without the typical London Area biotas. The whole aspect of the London Clay, especially the biota, now becomes much more like that of the Hampshire Basin, as wil be shown in the discussion to a paper on the London Clay of Shinlfield, Berkshire (Cooper, James & Ward, in preparation). This site has yielded a remarkable biota including the discovery of the first rhyncholites (nautiloid beaks) from the English Tertiary (Ward & Cooper 1972).

I would like to thank Miss B. East, Messrs C. I. Macadie and C. P. Nuttall and Drs R. H. Bate and A. J. Rundle for help in the field; Dr A. J. Rundle, Mr F. C. Stinton and Mr K. Hackett for naming the otoliths; Mr J. G. Maisey for naming the fin spines; Mr J. P. James for help with some of the gastropods and Mr D. J. Ward for naming the teeth.

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A Myxomycete New to the London Area and to Britain

by P. C. Holland

Myxomycetes are a group of organisms whose life-history falls into two distinct stages. In the early stage, called plasmodium, they have animal-like characteristics, creeping about and feeding on bacteria, resupinate fungi such as *Stereum hirsutum*, or fragments of dead vegetable matter. When full-fed and ready to reproduce they form fruiting bodies called sporangia, which may appear on the nutrient substrate or at some distance from it on the surrounding herbage. At this stage they are so much like fungi that early mycologists classified them as such.

It is the fruiting bodies which are collected for identification and these are so decay-resistant that, with the same sort of care that is given to collections of pressed plants and mounted insects, they will remain practically unchanged for very many years. This explains how it came about that a specimen I collected on dead herbaceous stems in Epping Forest near the Wake Arms (V.C.18) during a meeting of the Society on 26 October 1968 lay unexamined in my herbarium (No. PCH 2105) until many months later. It was clearly a *Craterium* and at a casual glance I had assumed it to be *C. minutum* (Leers) Fries, one of the more common species. The genus is characterised by goblet-shaped, stalked sporangia up to 1·5 mm high and capped by a disc-shaped operculum which falls off at maturity to release the ripe spores. In some species the operculum is less well defined. Within the cartilaginous sporangium wall the spores are supported by a system of hyaline, anastomosing, thread-like tubes (capillitium) which have aggregations of lime at the nodes. These lime-knots are white in *C. minutum* and just visible to the naked eye, easily seen under a lens. The absence of conspicuous white lime-knots in the Epping specimen was the first indication of something unusual. Under the microscope, abundant brown lime-knots of irregular shape could be seen and showed the specimen to be **Craterium concinnum** Rex (1894: 370). The sporangia, too, differed in shape from those of *C. minutum*, being broader than deep, more like champagne glasses than goblets. Other more minute differences between the two species were found in the spores (Lister 1925: 76; Martin & Alexopoulos 1969: 270).

Having satisfied myself as to the identification, I recalled having heard of the species being found by Miss Margaret Holden while foraying with the British Mycological Society and the British Naturalists' Association in Mad Bess' Wood, Ruislip (V.C. 21), on 28 September 1968. She had collected the specimen as a dirty-yellow plasmodium on oak leaves, in a pile of leaves and sticks. Mr Bruce Ing later identified it from the sporangia which subsequently developed and the specimen is in his herbarium under No. 68014.

Myxomycetes as a group are remarkably cosmospolitan, a feature said to indicate an ancient lineage. Some species are restricted to special habitats, but provided these habitats occur, many of the species associated with them are to be found all over the world. In America, *Craterium concinnum* has usually, perhaps always, been found on the burs and leaves of the American chestnut (*Castanea dentata* (Marsh.) Borkh.). In Europe, the most that can be said at present is that it is a litter-feeder. It is said to be not uncommon in Japan (Lister 1925: 76), but elsewhere it seems to be a rare species. It is reported from the eastern United States (Massachusetts to Virginia and Iowa), Jamaica, Colombia, the Netherlands, Poland and India (Martin & Alexopoulos 1969: 270). The first record for Europe seems to have been made by Madam N. E. Nannenga-Bremekamp from dry leaves near Bilthoven in the Netherlands (Nannenga-Bremekamp 1961: 61). Details of the Polish record escape me; the species is not mentioned in the Polish monograph published in 1960 (Krzemieniewska 1960). The two London Area finds reported here are evidently the third and fourth records for Europe. The fact that they were found independently, yet so near each other and within such a short space of time, is one of those coincidences which are strangely frequent in natural history.

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Plant Mapping Scheme

by Margaret E. Kennedy and P. C. Holland

The Botany Section's scheme for the mapping of the flowering plants and ferns of the London Area has now been running for eight years. As we have said in previous reports, the response has not been all we had hoped for. Nonetheless, a great deal of conscientious work has been put into it in the main by a small band of workers, and the results so far obtained by these efforts are shown on the accompanying map (Fig. 1). At first glance, this gives an impression of a good coverage except in the southernmost part of Surrey and the north-western squares in Hertfordshire. In order to correct this illusion, a second map has been prepared (Fig. 2). This shows all those squares for which fewer than 100 species have been recorded. For all these squares we feel that valuable work can still be done and indeed must be done, if the results we publish are to be worthwhile.

Although we set ourselves no firm deadline when we first began the project, we thought that ten years would be more than enough. This time is rapidly running out and we are seeking to make an all-out effort to cover the underworked squares in 1973 and 1974 and then to prepare for publication. Whilst thanking those who have already contributed records, we now urge all members interested in botany to get out into those underworked squares and record what they see in these remaining months.

We are grateful to H. A. Sandford for his assistance in the preparation of the figures.

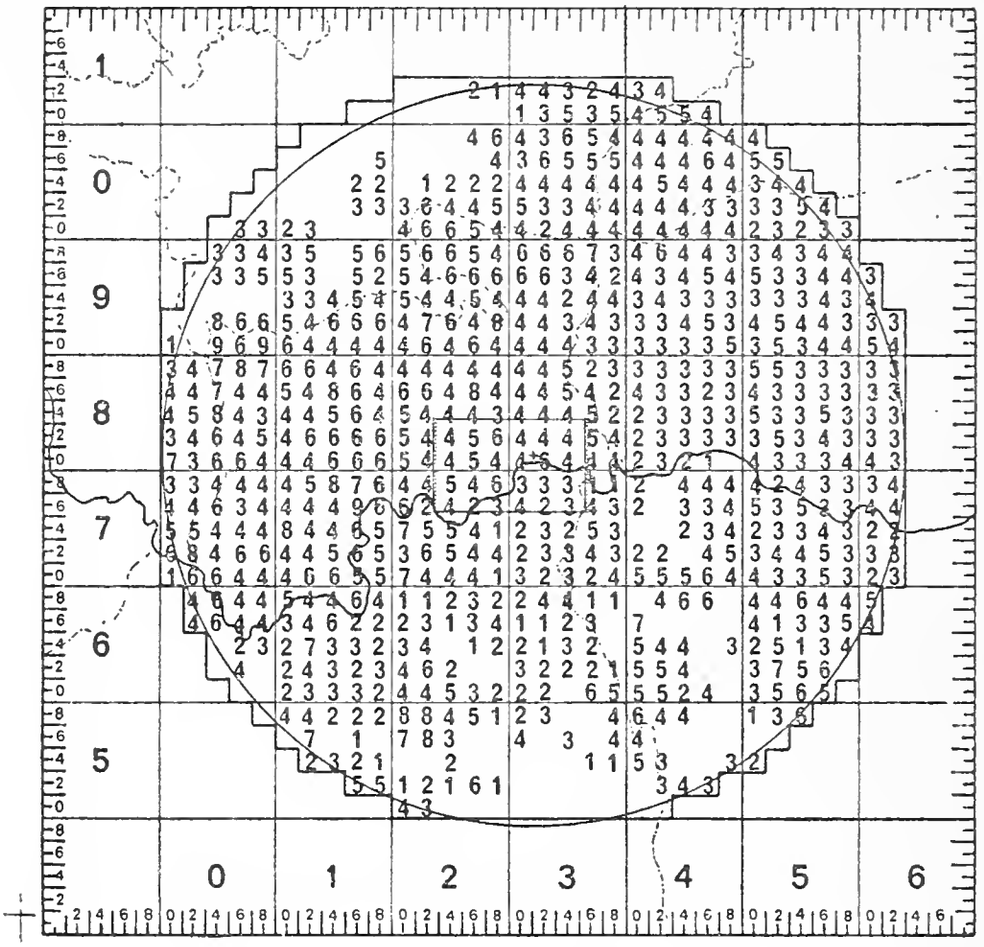

FIG. 1. The London Area showing the numbers of flowering plants and ferns recorded for each tetrad.

1 = up to 50 species
2 = up to 100 species
3 = up to 150 species
4 = up to 200 species
5 = up to 250 species
6 = up to 300 species
7 = up to 350 species
8 = up to 400 species
9 = over 400 species

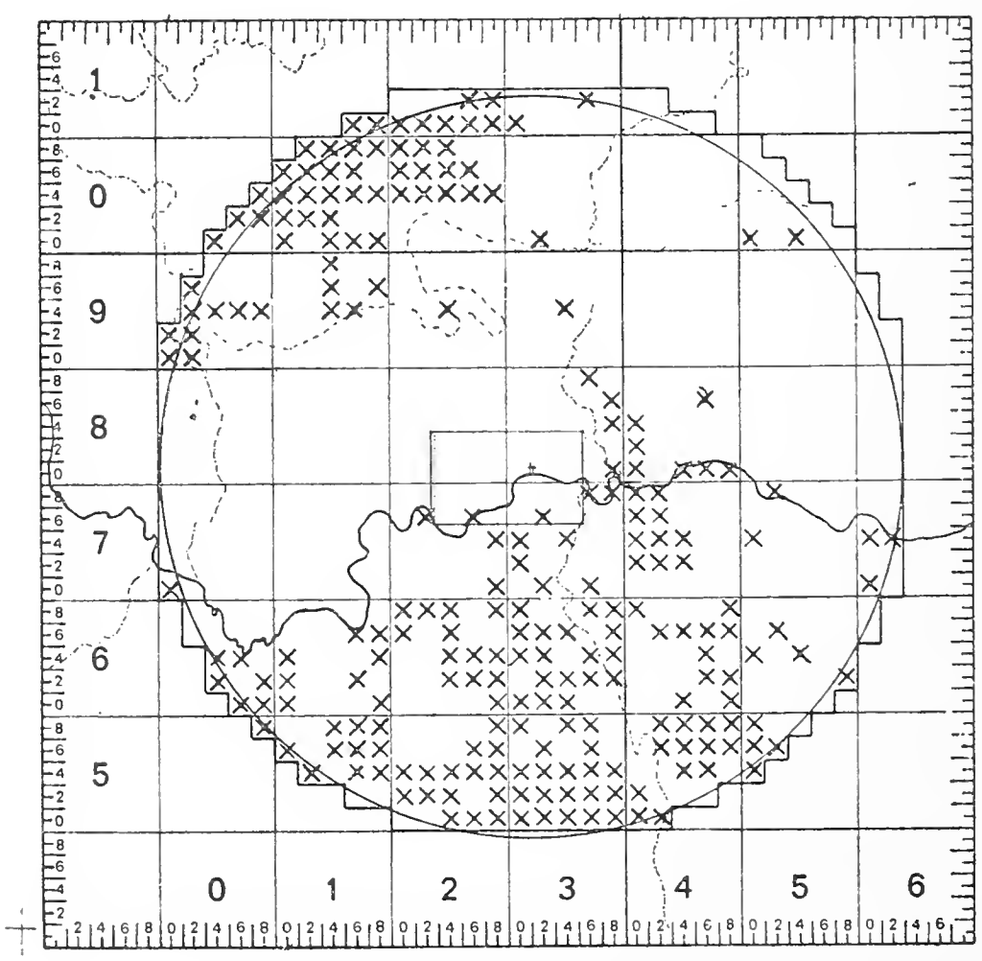

FIG. 2. The London Area showing the tetrads for which less than 100 species of flowering plants and ferns have been recorded (X).

Hemiptera-Heteroptera of the London Area

PART VIII

by Eric W. Groves

(Previous parts of this paper have appeared in *The London Naturalist* as follows: Pt. I (**43:** 34-66, 1964); Pt. II (**44:** 82-110, 1965); Pt. III (**45:** 60-88, 1966); Pt. IV (**46:** 82-104, 1967); Pt. V (**47:** 50-80, 1968); Pt. VI (**48:** 86-120, 1969); and Pt. VII (**50:** 87-94, 1972). A continuing list of abbreviations as to sources of records and for recorders' names has appeared at the beginning of each of the above parts.)

SOURCES OF RECORDS

The following are new sources of records:

(a) Published and manuscript:

64. Records from the private collection of L. Christie containing Heteroptera of his own gathering and those of J. Christie (all Surrey), together with some material of H. D. Swain and also of F. J. Coulson* (mostly Surrey).

65. Records from the private collection of the late H. G. Denvil, the Heteroptera of which (all Surrey) are now in the possession of L. Christie.

MIRIDAE (Capsid bugs) (*Contd.*)

Subfamily: ORTHOTYLINAE (*Concld.*)

Orthotylus virescens (D&S) Sp. 340 p. 263
D&S p. 339 (*Litosoma virescens*) & p. 345 (*L. chloropterus*)
S p. 290 (*O. chloropterus*)
B p. 489 (Sp. 367, *O. chloropterus* with *O. virescens* in synonymy)

Frequent, the adults are found on broom, *Sarothamnus scoparius* (*Cytisus scoparius*) from July to September. Both the adults and the larvae are partly predatory. The species overwinters in the egg stage.

Middx. Hampstead Heath, 5.vii.52, mostly ♂♂, *DL* (54); 5.viii.60, ♀♀ adults outnumbering ♂♂ but no larvae, *DL* (54) (HD); 15.viii.50, *DL* (54) (HD); Finchley, 11.vii.43, on *Cytisus*, *CHA* (17); Edgware (Scratch Wood), 26.vii.60, beaten from broom, larvae outnumbering the adults, *DL* (HD) (EMM, **97,** 68) (54); 31.vii.60, *DL* (HD); Hillingdon, 8.viii.36, a few on *Cytisus*, *DCT* (33a); and Hounslow Heath, 26.vii.53, *DL* (HD) (54); 26.vii.53, on broom, *WJLeQ*. (21).

* The main collection of F. J. Coulson (mostly Surrey) is in the care of the British Entomological & Natural History Society (formerly the South London Entomological & Natural History Society) abbreviated throughout this paper to SL.

HERTS. Whetstone, vi.-viii.60, single specimens (all ♂) taken on various dates in MV light trap, *PHW* (*pers. comm.*) (47); and just over the boundary at Harpenden 1934 (a single ♂) and 1935 (3 ♂♂), taken in a light trap in Rothamsted Expt. Stn. grounds, *DCT* (59); 3.viii.54, *GCES* (HD); Harpenden Common, 10.viii.37, on *Cytisus scoparius*, *DCT* (12).

ESSEX. Beyond the boundary at Danbury Common, 30.vii.60, *JHF* (42).

KENT. Blackheath, *D&S* (39); 31.vii.60, on broom, fairly common, sparingly at MV light, *AAA* (51) (22); Shooters Hill, 1900, *WW* (39); Charlton, *D&S* (39); Plumstead, 1894, *WW* (4) (39) (22); Birchwood, *JAP* (BM); Darenth Wood, 31.vii.09 and 7.vii.10, on broom, *WW* (60); 15.vii.50, on broom, *AMM* (22) (BM in AMM coll.); Westerham, 24.vii.60, plentiful on broom, *AAA* (51) (22); Farningham Wood, 15.viii.66, on broom, *AAA* (51); on the boundary at Gravesend, 21.vii.48 (on broom) and 22.vii.48 (at light), *TRES* (13) (22); and beyond at Ryarsh, *AMM* (22).

SURREY. Merton Park, 26.vii.35, on broom, *FJC* (SL) (MM); (garden in Springfield Avenue, S.W.20), abundant on cultivated broom, *FJC* (1/**1941-42:** 4) (62); Shirley Common, *WW* (62); Chipstead, 31.vii.10 and 14.viii.10, *ECB* (NM); Oxshott Heath, *WW* (62); and Weybridge, 21.vi.13, II instar larva, *EAB* (BM). On the boundary at Egham, 6.vii.55 and 7.viii.56, on broom, *GEW* (40); and Byfleet, 8.vii.50, *DL* (HD); and beyond at Chobham Common, 11.vii.37 and 16.viii.41, *ECB* (NM); 1874, *ES* (HD); 19.vii.68, on broom, *AAA* (51); Woking, viii. & ix.1888 and ix.02, *ES* (HD); Banks of the Basingstoke Canal between Byfleet and Woking, 8.vii.50, *SL* (1/**1950-51,** 73); Abinger, viii. 1900, *EAB* (BM); and Albury, 17.vii.43 and 26.vii.43, *ECB* (NM).

BUCKS. On the boundary at Datchet (Ditton Park), vii.55, *GEW* (40); just beyond at Whitend Park, N.W. of Chesham, 20.vii.61, on broom, *WJLeQ* (21); and at Hyde Heath, 15.x.50 *WJLeQ* (21).

Orthotylus concolor (Kb.) Sp. 341 p. 263
D&S p. 340 (*Litosoma concolor*) S p. 291
B p. 490 (Sp. 368)

Rare. Like the last species, this is also found on broom. The overwintering eggs hatch in June or the beginning of July and reach adult stage by late July to August. Essex records wanting.

MIDDX. Hampstead Heath, 30.vi.49, *DL* (SL, det. *TRES*) (1/**1949-50,** 36-38); and Hillingdon, 8.viii.36, 3 ♀♀ on *Cytisus*, *DCT* (33a).

HERTS. Just over the boundary at Harpenden, 25.viii.37, *BSW* in *PH* coll. (BM); and Harpenden Common, 10.viii.37, on *Cytisus scoparius*, *DCT* (12).

KENT. [A. A. Allen (*pers. comm.*) informs me that the Blackheath record attributed to him for this species in Massee's *Hemiptera-Heteroptera of Kent*, ed. 2 (1963, p.166) (see source 22) is incorrect—EWG]. Bromley, vii., amongst grass at the roots of broom bushes, *D&S* (28, as *virescens* D&S ♂); Farningham Wood, 15.viii.60, a few on broom, *AAA* (51); 2.vii.61, *KCS* (14); Westerham, 24.vii.60, on broom, common, *AAA* (22); and on the boundary at Gravesend, *TRES* (22).

SURREY. Esher Common, 9.vii. & 30.vii.51, 13.viii.51, and 10.ix. & 17.ix.51, *FJC* (SL); Weybridge, vii, by sweeping *D&S* (28, as *virescens* D&S ♂); *JAP* (BM). On the boundary at Egham, 6.viii.55, *GEW* (40); and beyond at Chobham Common, 19.vii.68, a few on broom, *AAA* (51); vii.1874, *ES* (BM) (HD) (37) (3) (62); Woking, viii.1888, viii.1890, ix.1888 and ix.1889, *ES* (HD) (37) (3) (62); Abinger, viii.1900, *EAB* (BM); Gomshall, *EAB* (3); and Holmbury, *EAB* (3).

BUCKS. Beyond the boundary at Burnham Beeches, 22.ix.54, on broom, *GEW* (40).

Orthotylus flavosparsus (Sahlb.) Sp. 342 p. 264
D&S p. 341 (*Litosoma flavosparsus*) & p. 344 (*L. prasinus*)
S p. 291 B p. 488 (Sp. 366)

Frequent, often locally common. This species which overwinters in the egg stage has two generations a year; adults of the first appearing by the end of June whilst those of the second are mature at the end of August. Southwood & Leston in *Land and Water Bugs* give the especial host plants of this species as being goosefoots (*Chenopodium* spp.) and oraches (*Atriplex* spp.). A. A. Allen's experience, however, has been that this bug favours fat-hen (*Chenopodium album*) exclusively. Even when good King Henry (*Chenopodium bonus-henricus*) grew alongside and later ousted *C. album*, *Orthotylus flavosparsus* was not found for a number of years until after the re-establishment of *C. album* in the locality (Allen, *pers. comm.*)

MIDDX. Regent's Park, 4.vii.42, *PJLR* (20); Stamford Hill, n.d., on *Chenopodium*, *EAN* (C); Hampstead Heath, 14.vii.49, *DL* (SL) (1/**1949-50**, 36-38); Finchley, 31.vii.43, on *Chenopodium*, *CHA* (17); Harefield, 19.vii.60, *DL* (HD) (54); Boston Manor, 16.ix.43, *HStJKD* (BM); and Hounslow Heath, 8.viii.53, common on *Chenopodium album* on the ash and rubble tip, *GEW* (33c) (54).

HERTS. Watford, 27.vii.60, *DL* (HD); West Hyde, 21.vii.36, under *Chenopodium polyspermum* *DCT* (12); and on the boundary at Harpenden, 22.vii.33, common to light, *DCT* (12); 1933-36, 53 ♂♂ (♀♀ nil) taken in light trap in Rothamsted Expt. Stn. grounds, *DCT* (59); 4.viii. & 12.viii.55, *GGES* (HD).

ESSEX. Woodford, 13.viii.25, adult and III instar larva, *EAB* (BM); and beyond the boundary at Writtle, viii.55, *JHF* (42).

KENT. Blackheath, 23.ix.1900, *AB* in *AJC* coll. (HD); 22.viii.68, adults and nymphs on *Chenopodium album* after a long absence, *AAA* (51) (22); near Charlton, 9.vii.58, *AAA* (51) (22); Plumstead, 17.ix.57, *AAA* (51) (22); Plumstead Marshes, *WW* (39); Abbey Wood marshes, 24.vii.54 (adult) and 31.viii.55 (adults and IV instar larva), *EWG* (24); Lee, *D&S* (28) (4) (22); Kidbrooke Lane, 19.ix.1896, on *Chenopodium*, *WW* (SL) (4) (39) (22); Lewisham, 1890, *AJC* (HD); *WW* (4) (39) (22); Darenth Wood, *AMM* (22); and on the boundary at Gravesend, *JAP* (BM); 20.viii.55, *GGES* (HD) and beyond at Higham, 23.viii.64, *KCS* (14) (22).

SURREY. Wimbledon Common, 24.vi.48, *FJC* (SL) (62); Cheam (Nonsuch Park), 22.vii.55, *EWG* (24); Ashtead, 13.ix. & 20.ix.48, *FJC* (SL); 25.ix.48, *FJC* (SL) (1/**1947-48,** 78); Ashtead Woods, 14.ix.47, *FJC* (SL) (1/**1948-48,** 71) (62); Bookham Common, viii, *DL* (34) (62); Oxshott Heath & Esher Common, 12.vii.52, *SL* (1/**1952-53:** 84); West End Common, 22.vi.48 and 28.viii.50, *FJC* (SL); 1952, *FJC* (SL) (MM); and on the boundary at Byfleet, *TRB* (37) (3) (62); and beyond at Gomshall, *EAB* (3); and Lingfield, 9.viii.48, on fat-hen, *AMM* (BM in AMM coll.)

BUCKS. On the boundary at Little Chalfont, 3.ix.53, *WJLeQ* (21); and beyond at Slough (PILG), various dates, on *Chenopodium*, *GEW* (40) (EMM **90,** 40).

Orthotylus rubidus (Fieb.) Sp. 343 p. 264
S p. 291 B p. 490 (Sp. 370)

Rare. This species is associated with glasswort (*Salicornia* spp.) growing on salt marshes, more especially where the tide does not normally cover the plants. It is thought that there may be two generations a year as adults have been found in early July and then again from mid-August until well on into October. Further search should be made for this species in the N. Kent marshes and S. Essex marshes within our Area.

ESSEX. Just beyond the boundary at Stanford, ix.38, abundant under *Salicornia*, *DCT* (in litt. to W.E. China).

KENT. Beyond the boundary at Swalecliffe, *EAB* (4) (22); and at Higham Marshes, *AMM* (22).

Orthotylus moncreaffi (D&S) Sp. 344 p. 265
S p. 291 var. B p. 491 (Sp. 370 var. *O. rubidus* var. *moncreaffi* D&S)

Rare. Occurs mainly on sea purslane (*Halimione portulacoides*) and other larger chenopods. It was originally described by Douglas & Scott in 1875 (EMM **11:** 146) based on a specimen discovered by Moncreaff said to have been on *Salicornia radicans* at Portsmouth. Subsequent authors have mentioned additional hosts but, as Southwood & Leston suggest in their paper on the ecology of this and the

preceding species (EMM **93:** 166-7, 1957) that, although several plants form a salt marsh community, it is *Halimione* alone that is the true host. Adults may be found from June to October. No records are available from Essex.

KENT. Abbey Wood marshes, 24.vii.54, *EWG* (24); and beyond the boundary at Higham Marshes, 6.vi.57, on sea purslane, *DL* (SL); 12.viii.62, associated with sea purslane, *AMM* (1/**1962,** 98) (22); Cliffe, 18.viii.54, on glasswort (*sic*) *AMM* (BM, in *AMM* coll.); and High Halstow, 2.x.54, many ♂♂ abundant on *Halimione*, DL (EMM **93:** 166-7) (HD).

Orthotylus diaphanus (Kb.) Sp. 345 p. 265
S p. 287 B p. 488 (Sp. 365)

Local. The adults which are found from July to September are associated with various willows (*Salix* spp.) particularly the white willow (*Salix alba*). The species overwinters in the egg stage.

MIDDX. Buckingham Palace grounds, 1961, on willow, *TRES* (52); Finchley, 31.vii.43, *CHA* (17); Harefield, 26.viii.51, on willow, *WJLeQ* (BM); 12.vii.52, on willow, *WJLeQ* (21); Mill Hill, 5.viii.58, *DL* (SL).

HERTS. Barnet, viii,1885, *EAB* (BM); Bushey, 25.vii.43, *CHA* (17); Cheshunt, 1900, *EAB* (NM); 14.ix.12, *EAB* (BM) (11) (12); *EAB* ex *J. J. Collins* coll. (HD); Broxbourne, 18.ix.09, *EAB* (BM); and on the boundary at Harpenden, 8.viii.37, on *Quercus* [*sic*] *DCT* (12).

ESSEX. Epping Forest (Theydon Bois), vii.22, *EAB* (BM).

KENT. Blackheath, 13.viii.63, common on *Salix fragilis*, *AAA* (54); 10.viii.59, singly at MV light, *AAA* (54); Lee, *D&S* (36) (4) (39) (22); *WW* (39); Lewisham (Chapman's Gardens), 28.vii.1896, on willow, *WW* (60); *WW* in *FJC* coll. (SL); 27.vii.1897, on willow, *WW* (60); Eltham, *D&S* (36) (4) (39) (22); Banks of the Ravensbourne, 26.vii.1896, on willows, *WW* (60) (SL); Bromley, viii.1887, *ES* (BM) (HD) (4) (39) (22).

SURREY. Wimbledon Common, *FJC* (62); Putney, 18.vii.1883, banks of the R. Thames, E. of Hammersmith Bridge, on willows, *EAN* (C, det *TRES*, 1954); Box Hill, *FJC* (62); Ashtead, *FJC* (62); Oxshott Heath, 28.viii.61, on sallow, *AAA* (51); on the boundary at Effingham, *FJC* (62); and Ripley, *EAB* (3); and beyond at Chobham, viii.1884, *ES* (HD); Abinger, viii.1900, *EAB* (BM); and Gomshall, *EAB* (3).

BUCKS. Just over the boundary at Chalfont St Giles, 16.viii.15, *EAB* (BM); Amersham, 11.viii.56, on *Salix alba*, *WJLeQ* (21); 1.ix.51, on willow *WJLeQ* (SL) (21); and at Slough (ICBFS), 12.viii.31, ♀ collected on *Salix alba WHG* (41); (PILG), 10.viii.64, on white willow, *GEW* (40) (EMM **96,** 128).

Pseudoloxops coccineus (Mey.-Dür) Sp. 346 p. 265
S p. 294 (*Loxops coccineus*) B p. 493 (Sp. 373, *L. coccinea*)

Local. Occurs on ash particularly the larger well-fruiting trees. The larvae which hatch in July become adult in August and may be beaten from suitable trees from then until the end of the following month. It overwinters in the egg stage.

MIDDX. Buckingham Palace grounds, 1961, common on the larger ash trees, also taken at light (Sept.), *TRES* (52); Mill Hill, 5.viii.58, *DL* (SL); Hampstead Heath, 15.viii.43, on ash, *CHA* (17); Edgware (Scratch Wood), 22.vii.60 (adults and V instar larvae), and 26.vii.60 (mainly adults), all beaten from ash, *DL* (54) (EMM **97,** 68) (HD); Feltham, vii.55, at MV light, *E. W. Classey* (SL).

HERTS. Whetstone, 29.viii.60, 2 ♀♀ taken in MV light trap, *PHW* (*pers. comm.*) (47); Barnet, *EAB* (37); (Hadley Wood) viii.1885, *EAB* (BM); Elstree, 5.viii.58, on ash, mostly adults, a few larvae of which 7 were parasitised, *DL* (EMM **95:** 98); Bushey, 25.vii.43, *CHA* (17); Chorleywood, 10.viii.16, *EAB* (BM) (11); Radlett, 10.viii.58, *DL* (HD); St Albans, *TAM* (37) (11); Cheshunt, 29.viii.18, *EAB*; and on the boundary at Harpenden, 1935, 2 ♂♂, taken in light trap in Rothamsted Expt. Stn. grounds, *DCT* (59).

ESSEX. Woodford, 15.viii.25, *EAB* (BM).

KENT. Blackheath, 6.viii. & 8.viii.59, singly at MV light, *AAA* (51); 25.viii. & 30.viii.65, on young ash in garden at 63 Blackheath Park, *AAA* (51); Lewisham, 1893, *WW* (39); Abbey Wood, *WW*, (4) (22); and Sevenoaks, *EAB* (4) (22).

SURREY. Camberwell (Ruskin Park), 1950, *SW* (1/**1951-52,** 43-44); Shirley, 11.vii.1896, on ash, *WW* (60); Banstead Downs, 23.viii.55, *EWG* (24); Reigate, *ES* (37) (3) (62); Headley Lane, 13.ix.03, on ash, *WW* (SL) (62); Box Hill, 29.viii.1896, on ash, *WW* (SL) (62); 29.vii.49, *FJC* (SL); 7.viii.37, 29.viii.37, 31.viii.36 and 7.ix.13, ♂♂ & ♀♀, *ECB* (NM); Ranmore Common, *EAB* (3); Bookham Common, 6.viii.1895, on ash, *WW* (60) (62); *DL* (34); Oxshott Heath, *TRB* (37) (3) (62); Arbrook Common, 7.ix.48, *FJC* (SL) (62); and on the boundary at Westcott, ix.1899, *EAB* (BM); and beyond at Chobham, *ES* (37) (3) (62); Abinger, viii.1900, *EAB* (BM); Gomshall, on ash, *EAB* (C) (3); and Shalford, viii.1886, *EAB* (BM) (37) (3) (62).

BUCKS. Horton, 12.ix.54, *GEW* (40); and on the boundary at Datchet, 31.vii.55, *GEW* (40); and just beyond at Slough (PILG) various dates, on ash, *GEW* (40) (EMM **90,** 40).

Cyrtorhinus caricis (Fall.) Sp. 347 p. 265
D&S p. 351 (*Sphyracephalus elegantulus*)
S p. 283 B p. 479 (Sp. 351)

Very local. Found on rushes and sedges, usually at the bases of

clumps. It is predatory on the eggs of leaf hoppers especially of the family *Delphacidae*. Orange coloured on first hatching in early June the larvae later became bright green. The adults should be looked for from July to October. Kent records required.

MIDDX. Hampstead Heath, 17.viii.49, a single specimen found by sweeping reeds at Viaduct Pond, *DL* (1/**1949-50:** 36-38) (54); 4.viii.43, *CHA* (17); 18.viii.44, on *Juncus* and *Carex*, *CHA* (17); 19.vii.57, *DL* (SL); Muswell Hill, viii.20, *EAB* (BM); Ruislip Local Nature Reserve, 17.viii.62, 2 ♂♂ swept from *Carex flacca* in North Marsh, *WFS* (49); 22.viii.64, a single adult on same host plant in South Marsh, *RAPM* (49); Harefield, 22 viii.16, *EAB* (BM); and Hounslow Heath, 6.viii.52 and 14.vii. & 30. vii.53, fairly common in the swamp, *GEW* (33b) (54) (EMM **92:** 296); 26.vii.53, *WJLeQ* (23); 9.viii.53, abundant, *DL* (54) (HD).

HERTS. Barnet, viii.1885, *EAB* (BM) (37); Batchworth Heath, 24.vii.16, *EAB* (BM); Rickmansworth, 4.viii.57, *WJLeQ* (21); and North Mimms, *EAB* (11) (12).

ESSEX. Epping Forest (Chingford), 12.vii.12 (adult) and 10.vi.11 (II instar larva), *EAB* (BM); (High Beach), ix.07, *EAB* (BM); (Loughton), ix.07, *EAB* (BM); n.d. *GCC* (37); 30.vii.50, *DL* in *WJLeQ* coll. (21); (Wake Valley pond), n.d., by sweeping sedges, *CN* (35a).

SURREY. Wimbledon Common, 4.viii.1876 and ix.1875, *ES* (HD) (36) (37) (62); viii.1864, *JAP* (28); 10.ix.1882, by sweeping rushes in the ravine, *EAN* (C); 21.viii.1896, by sweeping in ravine, *EAN* (C); 1.vi.22, I instar larva, *EAB* (BM); 8.x.51, at roots of *Juncus* around pond, *TRES* (13); Surbiton, *ES* (37) (62); Chipstead, 23.vii.11, *ECB* (NM); Reigate, *ES* (37) (62); Godstone, 20.viii.66, *KCS* (14); Bookham Common, 15.viii.53, common at bases of clumps of *Juncus*, *DL* (1/**1952-54:** 89); Oxshott Heath, *TRB* (37) (62); West End Common, 8.viii.09, at roots of reeds, *WW* (60) (1/**1908-9,** 69) (62); 1952, *FJC* (SL); and on the boundary at Byfleet, *ES* (37) (62); and Egham, 23.vii.54, *GEW* (40); and beyond at Chobham, viii.1882, *EAB* (BM); viii.1884, *ES* (HD) (37) (62); Woking, *ES* (36); 15.viii.1891, *AJC* (HD); Horsell Common, 7.viii.11, *ECB* (NM); and Shalford, *ES* (37) (62).

BUCKS. On the boundary at Little Chalfont, 25.viii.54, *WJLeQ* (HD) (21); 18.viii.62 and 1.ix.53, *WJLeQ* (21); and beyond at Slough, 2.ix.59, swamp, *GEW* (40) (EMM **91,** 54, 1955); and Burnham Beeches, *n.c.* (26).

Neomecomma bilineatus (Fall.) Sp. 348 p. 266
S p. 286 (*Orthotylus bilineatus*)
B p. 482 (Sp. 356, *O. bilineatus*)

Local. Adults of this bug, found from July until the beginning of September, occur on aspen (*Populus tremula*) and sometimes on

grey poplar (*Populus canescens*). The species overwinters in the egg stage.

MIDDX. Buckingham Palace grounds, 1961, on young poplar trees, probably introduced in the egg stage in tree, *TRES* (52); Mill Hill, 5.vii.58, *DL* (SL); Edgware (Scratch Wood), 18.vii.60, adults only in abundance on aspen, some *in cop.*, *DL* (54) (HD); Ruislip LNR, 8.viii.64, adults common on aspen, *RAPM* (49); and Hillingdon, 17.vii.33 (adults), 26.vi.37 (IV instar larvae) and 1.vi.37 (I instar larvae), abundant on *Populus tremula*, *DCT* (33a).

HERTS. Whetstone, 3.vii.60, a single ♂ taken in light trap, *PHW* (*pers. comm.*) (47); Bushey, 23.vii.44, *CHA* (17); Bricket Wood Common, 3.vii.56, V & IV instar larva, *EWG* (24); and just over the boundary at Harpenden, 16.vii.34 (a single ♂) and 1935 (6 ♂ ♂) taken in light trap in Rothamsted Expt. Stn. grounds, *DCT* (12) (59); and beyond at Wymondley, *EAB* (C) (11) (12).

ESSEX. Epping Forest, 6.ix.19, *ECB* (NM); (Loughton) vii.04, EAB (BM); viii.04, *EAB* (C) (NM); 3.vii.15 (IV instar), 13.vii.12 (IV instar) and 3.ix.09, *ECB* (BM); (Monk Wood), on aspen, occasionally abundant, *CN* (35a); Purfleet, *RML* (5); and on the boundary near Harlow, 1.viii.50, sweeping in green lanes, *WAS* (35b).

KENT. Blackheath, 3.vii., 4.vii. & 8.vii.59 and 21.vii.60 at MV light, not common, *AAA* (51) (22); (Shooters Hill), 29.vii.13 ♀ on aspen *WW* (60) (4) (39); on aspen, not rare, *AAA* (51) (22); Plumstead (Wickham Lane), 15.viii.1896, on aspen, *WW* (60) (SL) (4) (39) (22); and Darenth Wood, 7.ix.63, on aspen, *AAA* (51).

SURREY. Wimbledon Common, 1.vii.05, *ECB* (NM); *FSS* (37) (3) (62); Oxshott Heath, 2.ix.50, on aspen, *DL* (SL, det. *TRES*) (1/**1950-51:** 79); Esher Common, 26.vii.19, n.c. (SL); and on the boundary at Byfleet 6.vii.42, *FJC* (SL); and beyond by the Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50).

BUCKS. Just over the boundary at Hedgerley, 17.vii.55, on aspen, *GEW* (40); Hodgemoor Wood, W. of Chalfont St Giles, 30.viii.52, on aspen, *WJLeQ* (21); Stoke Common, 7.viii.54, on aspen, *WJLeQ* (21); and Slough (PILG), 5.vii.60, on *Populus alba*, *GEW* (40) (EMM **96:** 128); and beyond at Hyde Heath, 14.viii.15, *EAB* (BM).

Mecomma ambulans (Fall.) Sp. 349 p. 266
D&S p. 349 (*Sphyracephalus ambulans*)
S p. 282 B p. 477 (Sp. 350)

Frequent. Occurs in rank vegetation of clearings and at margins of woods, especially if the soil conditions are damp and rushes are present. The eggs are laid on the rush stems and the young larvae which hatch in late May, may be found at the roots of rush clumps. Adults appear at the end of June and do not die off until early Sep-

tember. The males are always macropterous; the females usually brachypterous though sometimes developed forms may be found.

MIDDX. Hampstead Heath, 18.vii.43, on *Populus alba*, *CHA* (17); 1.viii.43, on *Rubus* sp., *CHA* (17); 8.vii.49, on *Holcus lanatus*, *CHA* (17); Highgate (Gravel Pit Wood), vii.1886, beaten out of bushes, *EAN* (C); Highgate Wood, 11.vii.1891, by beating, *EAN* (C); Finchley, 8.vii.44, abundant, *CHA* (EMM **81,** 163-4); Edgware (Scratch Wood), 18.vii.60, adult ♀, *DL* (54); 22.vii. & 23.vii.60, *DL* (HD); Ruislip LNR, vii.64, ♂ ♂ only, in vegetation around trees, *RAPM* (49).

HERTS. Aldenham, 23.vii.61, *DL* (54) (HD); Bushey Heath, 23.vii.44 *CHA* (1/**1944-45:** 9) (EMM **81:** 163-4); Bricket Wood Common, 3.vii.56, *EWG* (40); Hatfield, 19.vii.64, *PLJR* (MM); and on the boundary at Harpenden, 5.vii. & 17.viii.54, *GGES* (HD); and beyond at Wymondley *EAB* (11) (12).

ESSEX. Epping Forest, 21.vii.09, rare macropterous ♀ by searching at roots of rushes, Cuckoo Pits, *EAB* (38) (35a); (Chingford), vii.1892 ♀, ix.1891 ♀, 22.vi.11 ♂, 22.vii.09 ♂, 10.vi. & 22.vi.11 (II instar larvae), all *EAB* (BM); and beyond the boundary at Danbury Common, 12.viii.53, *AMM* (BM, in AAA coll.)

KENT. Lewisham, n.d., *WW* (1/**1900,** 82); Shooters Hill, 15.viii.63 ♀, by sweeping in a marshy wooded situation, *AAA* (51); Plumstead, vii, by beating and sweeping, *D&S* (28) (4) (22); Abbey Wood, *WW* (4) (39) (22); Lee, *WW* (4) (39) (22); Grove Park, *WW* (4) (39) (22); Bromley, 22.vi.66, *PJC* (63); West Wickham Wood, 3.vii.12, sweeping in the wood, *WW* (60); Westerham, 12.vii.22 ♀ *PH* (BM); 24.vii.60, by sweeping beside a wood, very local and not common, ♂ ♂ readily taken to flight, *AAA* (51) (22); Darenth Wood, vii.09, *WW* (60); and just beyond the boundary at Trottiscliffe, 25.viii.62, *AMM* (1/**1962,** 100).

SURREY. Wimbledon Common, 30.vi.1897, *EAN* (C); 7.vii.1897, sweeping in the ravine, *EAN* (C); 10.vii.25, IV instar larva, *F. C. Sawyer* (BM); 12.vi.48, *FJC* (SL) (62); Croydon, viii.1879, *ES* (HD); Shirley, 3.vii.12, sweeping in the enclosures, *WW* (60) (62); Purley, 14.vii.37, *FJC* (MM); Banstead Heath, 3.ix.62, *PSB* (16); Chipstead, 20.vii.13 ♂, 23.vii.11 ♂ and 29.x.11, *ECB* (NM); Reigate, *WW* (62); Oxted, 11.vi. & 25.vii.93, *AJC* (HD); Headley Lane, 15.vi.1893, by sweeping long grassy herbage, rare macropterous ♀, *RML* (*Entom.* **28,** 312, 1895) (38) (62); *WW* (62); Box Hill, 17.vii.38 ♂, *ECB* (NM); 20.viii.52, a single ♀ by sweeping, *AMM* (BM, in AMM coll.); 11.vii.34, *FJC* (SL) (62); Mickleham Downs, ♂, *JAP* (BM); 29.vi.11 ♂, *ECB* (NM); Claygate, ♂ & ♀, *JAP* (BM); Ashtead, 10.vii.48 ♂, *FJC* (SL) (MM); 15.vi.48 ♀, *FJC* (SL); Ashtead Woods, *FJC* (62); Bookham Common, 1.vii.49 ♂ *FJC* (SL) (62); 7.viii.50 ♀, *DL* (HD); vii. & viii., *DL* (34); 8.vii.56 ♂, *EWG* (24); 25.vii.64, 20.vii.69, 5.viii.69 and 11.viii.69, *PSB* (16); Oxshott Heath, 16.vii.1899, *ECB* (register)

(NM); 26.vii.48 ♂ & ♀, *FJC* (SL) (62); 28.vii.57, *GGES*; Esher Common, vii.11, sweeping under birch, *WW* (60); 19.vii.48, 27.vii.53 and 13.viii.51 ♀, *FJC* (SL) (62); West End Common, 4.viii.53 ♀, *FJC* (SL) (62); Arbrook Common, 30.vi.52 and 7.vii.53 ♂, *FJC* (SL); and on the boundary at Byfleet, 24.vi.49, *FJC* (SL) (62); and beyond at Virginia Water, 7.vii.56, *GEW* (40); Chobham, vii.1892, *ES* (HD); Woking, viii.1888, *ES* (HD); *FPP* (HD, presented 1909); Gomshall, viii.1892, *EAB* (BM); Shere, viii.1892, *EAB* (BM); Ewhurst, viii.1899, *EAB* (BM); Holmbury, viii.1892, *EAB* (BM); Hindhead Common, 13.vii.63, *PSB* (16); and Chilworth, 25.vii.44, *ECB* (NM).

BUCKS. On the boundary at Fulmer, 12.vii.64, *WJLeQ* (21); just over the boundary at Amersham, 11.viii.56, on *Salix alba*, *WJLeQ* (21); and Hodgemoor Wood, W. of Chalfont St Giles, 3.vii.55, *WJLeQ* (21); and beyond at Burnham Beeches, 30.vi.54, *GEW* (40) (EMM **91,** 54); Little Missenden, 13.vii.52, *WJLeQ* (21); Turville Heath, 18.vii.65, *WJLeQ* (21); and Coombe Hill, 21.vii.51, *WJLeQ* (21).

Mecomma dispar (Boh.) Sp. 350 p. 267
S p. 281 (*Globiceps dispar* and *G. ater*)
B p. 476 (Sp. 349, *G. dispar* and Sp. 349 var., *G. ater*)

Rare. In our Area it has only been recorded from Surrey and that was in the last century. Elsewhere in Britain it has been found in rank vegetation on marshes, on sandhills and in short turf on cliff tops. The adults have been recorded from June to August. As in *M. ambulans* the ♂ ♂ of this species are always fully winged, the ♀ ♀ rarely so. The ♀ ♀ are more usually brachypterous.

SURREY. Oxshott Heath, *TRB* (3).

Subfamily: MIRINAE

This subfamily of capsids has 73 native and 2 alien species recorded in Britain; of these 61 native and 1 alien species have so far been found in the Society's London Area.

Myrmecoris gracilis (Sahlb.) Sp. 351 p. 268
B p. 446 (Sp. 319)

Rare. A predator occurring from the end of June until August on heaths and commons where it feeds mainly on aphids living on grasses. The adults which strongly resemble the ant *Formica fusca* have been occasionally recorded elsewhere in Britain in nests of this species and others of the same genus, where it feeds probably on pupae and dead ants. In the Home Counties it has been taken so far only in Surrey.

SURREY. Just over the Society's boundary at Longcross Halt railway station between Egham and the northern edge of Chobham

Common, 27.vi.59, in small numbers among grass and *Medicago lupulina* between tarmac track and railway, on S. side of railway east of the station, *GEW* (40).

Pithanus maerkeli (H.—S.) Sp. 352 p. 269
D&S p. 281 S p. 219 B p. 445 (Sp. 318)

Frequent. A predatory species whose adults are found associated with grasses, sedges and rushes from mid-June onwards. The males are comparatively short lived but the females may be found until the end of August. Both sexes are invariably micropterous.

MIDDX. Hampstead Heath *JAP* (BM); 4.vii.43, on *Deschampsia flexuosa*, *CHA* (17); Highgate, 22.vi.1893, *EAN* (C); Pinner, vii.22, *OGH* (BM); Ruislip LNR, vii.64, a single adult swept from grass area, *RAPM* (49); Heston, 14.vii.39, *HStJKD* (BM); and Hounslow Heath, 23.vi.57, occasional amongst *Calluna* and grass on the heath area, *GEW* (33c) (54).

HERTS. Elstree, 22.vi.60, ♂♂ and ♀♀ common in grasses, *DL* (HD) (54); Aldenham, 23.vii.61, *DL* (HD) (54); Bricket Wood Common, 3.vii.56, *EWG* (24); just over the boundary at Harpenden (Rothamsted Expt. Stn. grounds), 12.vii.55, *GGES* (HD); and beyond at Tring Hills, 14.viii.33, *DCT* (12).

ESSEX. Epping Forest, n.d., by sweeping long grass in damp places, generally distributed, *CN* (35a); 15.vi.57, *WJLeQ* (21); (Chingford), 10.vi.11, and vii.1893, *EAB* (BM); (Theydon Bois), vii.22, *EAB* (BM); and beyond at Danbury Common, 18.vii.64, *PLJR* (MM); 10.vii.66, *PSB* (16).

KENT. Blackheath, 23.vii.64 and 24.vii.66, on grass overhanging small garden pond, singly, *AAA* (51); Plumstead, *WW* (39); Burnt Ash, near Grove Park, 27.vi.1900 and 2.vii.1900, by sweeping in meadows, *WW* (60); Lee, *WW* (4) (39); Kidbrooke, *WW* (39); Lewisham, *WW* (39); Eltham, *D&S* (4) (39); Swanscombe, 12.vii.64, *PSB* (16); Darenth, 28.v.1893, winged form, *AJC* (HD); Farningham Wood, 5.vii.65, *KCS* (14); Westerham, 24.vii.60, common on grass hillside, *AAA* (51).

SURREY. Shirley, n.d., *GBR* per *FJC* (62); viii.1892, a single rare macropterous ♀, *JAP* (38); Wimbledon Common, 20.vi.1897 and 7.vii.1897, on grasses near the windmill, *EAN* (C); Nonsuch Park, Cheam, 22.vii.55, V instar nymph, *EWG* (24); Reigate (prior to 1867), in saw-pit in Wray Park, *J&TL* (32); Headley Lane, *WW* per *FJC* (62); Mickleham Downs, 17.vii.48, *FJC* (SL) (1/**1948-49:** 73) (62); Ashtead Common, 21.vi.47, *FJC* (SL) (62); Bookham Common, 30.vi.45, *FJC* (SL) (34) (62); 30.vii.51 and 3.viii.58, *DL* (SL) (34); 2.viii.60, *DL* (HD); 29.vii.50 *DL* (1/**1950-51,** 76); 19. & 20.vii.69 and 31.vii.69, *PSB* (16); V instar 9.viii.53 and 10.vii.55, *EWG* (24); West End Common, Esher, 9. & 30.vii.51, *FJC* (SL); Esher Common *JAP* (BM); 21.vii.53, *FJC* (SL); 4.viii.55, *EWG* (24); Oxshott Heath,

vii.04, *EAB* (BM); vii.16, *WJA* (SL); 15.vii.53, *FJC* (SL); 2.vii.60, *DGH* (57); and beyond the boundary at Chobham Common, vi.1888, *ES* (HD) (BM); vii.1888 (HD); vii.1880, a single rare macropterous ♀, *EAB* (38); n.d., *GBR* per *FJC* (62); 19.vii.68, nymph and adult at roots of *Medicago lupulina*, *AAA* (51); Woking, vi.1888, *ES* (HD); vii.1880, *ES* (HD); Byfleet, 19.vi.15, *EAB* (BM); 28.vi.47 and 11.viii.39, *FJC* (SL) (62); (Basingstoke Canal), 8.vii.50, adults and last instar nymphs, along canal path, *DL* (1/**1950-51,** 73); Weybridge, *JAP* (BM); Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Gomshall, 9.viii.26, *FJC* (SL) (62); and at Chilworth, 25.viii.1885, by sweeping weedy hedgebank, *EAN* (C).

BUCKS. On the boundary at Chalfont St Peter, 15.vii.25, *EAB* (BM); Datchet (Ditton Park), various dates, *GEW* (40); and just beyond at Slough (PILG), various dates, *GEW* (40); Latimer, 3.vii.54, *WJLeQ* (21); Chesham Vale, 5.vii.52, *WJLeQ* (21); Amersham, 7.vii.51, *WJLeQ* (21); 13.vii.49, *DL* in *WJLeQ* coll. (21); and Shabbington Wood, 16.vi.57, *GGES* (HD).

Lygus pratensis (L.) Sp. 355 p. 275

Woodroffe in his 1966 paper (*Entomologist* **99:** 201-206) demonstrated that *Lygus pratensis* prior to that date was in fact a complex species. The specimens he was able to check formerly considered as *L. pratensis* proved to be a mixture, some being *L. punctatus*; others *L. maritimus*, *L. wagneri* or *L. rugulipennis*. He gives (*loc. cit.*) a key separating out the genus *Lygus* with descriptions and notes for what he considered are the new circumscriptions of the five British species. Until voucher specimens for the earlier records of *L. pratensis* can be checked all such records prior to 1966 must be disregarded. The true *L. pratensis* is essentially a species of ancient woodland, mostly taken singly along the sides of rides. The host plant is as yet unknown.

The few authentic records from the London Area are as follows:

KENT. Farningham Wood, 6.i.60, *KCS* (14); and beyond the boundary at Gravesend, no data, *TRES* (13).

SURREY. Box Hill, 1.x.55, *DL* (HD); Bookham Common, *AMM* per *GEW* (40); and beyond the boundary on Witley Common, ix.61, a single example on ground among gorse and heather, *GEW* (40).

Lygus maritimus Wagner Sp. 356 p. 275

Although essentially a coastal species found on *Matricaria*, *Beta*, *Cakile*, etc., occasional specimens may occur inland mostly on *Matricaria* growing on waste land. A variety, var. *gravesteini* Wagner, now also recognised in Britain and recorded from two localities given below, should be searched for elsewhere in the London Area on *Ulex* and *Chenopodium album*.

MIDDX. Cripplegate bombed site, City of London, 23.vii.55 and 28.vii.56, ♂ ♂ & ♀ ♀, *EWG* (24); Hounslow Heath, 26.vii.53 *WJLeQ* (21); no data, *GEW* (40).

ESSEX. Waltham Abbey, 12.ix.10, V instar, *EAB* (BM); Woodford, viii.25, V instar, *EAB* (BM); and beyond the boundary at Widford, vii.55, *JHF* (42).

KENT. Blackheath (garden at 63 Blackheath Park), usually at flowers of golden-rod (*Solidago virgaurea*) or Michaelmas daisy (e.g. 20.ix.58); only once at light (17.vii.59), both records *AAA* (51); (Shooters Hill) 4.v.59, a single specimen on oak, *AAA* (51); (Bostall Woods), 27.ix.58, a single specimen at roots of clover, AAA (51); Plumstead, 28.x.93, *AJC* (HD); 17. & 20.ix.57, in plenty from orache in sand-pit, *AAA* (51); Abbey Wood, 3.vii.52, *AAA* (51); Abbey Wood marshes (Erith marshes), 24.vii.54 and 31.viii.55 (adults, V & IV instar larvae), *EWG* (24); 16.x.59, a few only, *AAA* (51); Stone, near Dartford, 24.v.60, *KCS* (14); Swanscombe, 22.v.65, *KCS* (14); and Bromley, 3.x.64, *PJC* (63).

SURREY. Merton Park, S.W.20, 19.iv.36, *FJC* (SL); Wimbledon Common, 26.ix.41 ♂ and 6.x.41 ♂, *FJC* (SL); Ewell, 10.ix.20, V instar larvae, *EAB* (BM); Reigate Hill, n.d., *GBR* (*EMM* **96:** 214); Headley, 6.ix.64, *KCS* (14); Bookham Common, viii., ix, x, *DL* (34); West End Common, Esher, 5.x.50, ♂ & ♀, *FJC* (SL); and beyond the boundary at Egham, 15.x.55, (var. *gravesteini*), on gorse and *Chenopodium* *GEW* (40); Woking, viii.1888, *ES* (HD); and Camberley, viii.33, *EEG* (BM).

BUCKS. On the boundary at Datchet (Ditton Park), various dates, *GEW* (40); Horton, various dates, *GEW* (40); just over the boundary at Stoke Common, 17.viii.52, *WJLeQ* (21); Slough (PILG), various dates, *GEW* (40); and beyond at Coombe Hill, 1.ix.51, *WJLeQ* (21). The var. *gravesteini* has also been taken at Slough, 14.x.55, *GEW* (40).

Lygus rugulipennis Popp. EUROPEAN TARNISHED PLANTBUG Sp. 357 p. 276.

Formerly called *L. pubescens* Reut. this species was recognised as distinct from *L. pratensis* and added to the British list by Leston in 1951 (*EMM* **86:** 244-246). Subsequently Southwood, in 1956 (*Bull. ent. Res.* **46:** 845-848), showed that *L. pubescens* was the more common of the two.

Common throughout the London Area, this species favours a variety of plant hosts including *Urtica*, *Rumex* and *Trifolium* on which the eggs are laid either in the flower heads or on the stems. It has two generations a year; adults of the first generation being mature by July, and those of the second generation by the latter half of September.

MIDDX. Cripplegate bombed sites, City of London, 26.v.56, *EWG* (25); St. John's Wood (Finchley Road), 1. & 5.vii.50, *DL* (HD)

(54) (EMM **87:** 244); Hampstead Heath, IV & X, *DL* (54) (EMM **87:** 244); Ken Wood, x, *DL* (54) (EMM, **87:** 244); Highgate, x, *DL* (54) (EMM, **87:** 244); Palmer's Green, 29.x.18, *EAB* (BM); Edgware (Scratch Wood), 22. & 23.vii.60, *DL* (54) (HD); Ruislip, 16.iii.52, to light, *W. E. Minnion* (HD); Ruislip LNR, vii.64, common on nettle, *RAPM* (49); Harefield, 15.iii.52, *WJLeQ* (21); Uxbridge, 23.viii.64, *PLJR* (MM); Heston, 1924 ♂, *HStJKD* (HD); and Hounslow Heath, 26.vii.53, *WJLeQ* (21); various dates, *GEW* (40) (54).

HERTS. Whetstone, 21.viii.60, ♂ taken in MV light trap, *PHW* (*pers. comm.*) and (47); Barnet, viii.1885, *EAB* (BM); Boreham Wood, 27.vi.60, *DL* (54) (HD); Elstree, 22.vi.60, *DL* (HD) (54); Watford, 27.vi.60, *DL* (HD) (54); Rickmansworth, 1.viii.48 and 3.ix.54, *DL* (HD) (54) (EMM, **87:** 244); West Hyde, 12.vii.52, *WJLeQ* (21); Radlett, 27.vi.60 ♂♂, *DL* (54); 10.viii.58, *DL* (HD) (54); Brickett Wood Common, 29.viii.64, *PLJR* (MM); St Albans, 29.viii.64, *PLJR* (MM); Broxbourne, 1963, *BSN* (58); and over the boundary at Berkhamsted, 14.x.62, *PSB* (16); Redbourn, 23.vii.60, *DL* (54); and Harpenden (Rothamsted Expt. Stn. grounds), 12.vii.55 *GGES* (HD).

ESSEX. Waltham Abbey, 12.ix.10, *EAB*; n.d., *DL* (EMM **87:** 244) Epping Forest, n.d., generally distributed, *CN* (35a); (Loughton), 13.ix.1897, *EAN* (C); (Woodford), viii.25, *EAB* (BM); n.d., *DL* (EMM **87:** 244).

KENT. Blackheath (63 Blackheath Park), 'not common every year (rare in 1958 for instance), common first week of Sept. 1957 and into Oct. 1957, also common in autumn of 1959'; 18.xi.59, several among dead beech leaves; 6.xi.52, two specimens swept in garden; occasionally at MV light, such examples tending to a fuscous colour (27.vii.60, 1.vii.68, and 30.vi.69), all records of *AAA* (51); Blackheath, 20.iv.1891, *AB* in *AJC* coll. (HD); 26.vii.1898 *AJC* (HD); Shooters Hill, 17.x.11, sweeping on waste ground, *WW* (60); Charlton, 9.ix.58, on waste ground (now built on), *AAA* (51); Kidbrooke, 15.ix.1894, *WW* (SL); Abbey Wood marshes (Erith Marshes), 31.viii.55, *EWG* (24); Erith Marshes (part near Slade Green), 16.x.59, very common everywhere, *AAA* (51); Swanscombe, 11.v.57 and 29.x.54, *KCS* (14); Darenth, 1890 and 14.v.1893, *AJC* (HD); Darenth Wood, 24.ii.62, at grass roots, *KCS* (14); Fawkham, 31.viii.50 and 11.ix.54, *GGES* (HD); Horton Kirby, 1.iii.55, *KCS* (14); Farningham Wood, 7.i.57, 6.i.60, 5.ii.61, 26.ii.63, 10.iii.63 and 4.xi.62, *KCS* (14); Eynsford, viii., *DL* (EMM **87:** 244); Downe (Darwin's Bank), 15.ix.62 and 19.x.63, *KCS* (14); Shoreham, 19.i.64, 19.vi.60 and 17.vii.60, *KCS* (14); and on the boundary at Sevenoaks (Knole Park), 9.ix.61, in grass tufts, *AMM* (1/**1961,** 88).

SURREY. Barnes, n.d., *DL* (EMM **87:** 244); Wimbledon Common, 15.ix.48, 24.ix.41 and 6.x.41, *FJC* (SL) (EMM **87:** 244); 25.vi.55, *EWG* (24); Cheam (Nonsuch Park), 8.vii.55 and 13.viii.54, *EWG* (24); Coulsdon, 13.x.12, *ECB* (NM); Caterham (Pilgrim Fort),

3.11.68 and 9.v.70, amongst grass roots on tip, *KCS* (14); Reigate (Wingate Hill), 1.viii.49, on downland, *GBR* (45); Ranmore Common, 27.viii.62, *PSB* (16); Mickleham, *DL* (EMM **87:** 244); Box Hill, 15.ix.34, *FJC* (SL); 27.viii.50, *DL* (HD); 2.x.55, *EWG* (24); 24.ix.59, a few noted, *AAA* (51); Epsom Common, 6.ix.53, *EWG* (24); Ashtead, 10.vii.48, *FJC*; *DL* (EMM **87:** 244); Leatherhead *DL* (EMM **87:** 244); Bookham Common, adults taken July (earliest 8.vii.56) to November (latest 8.xi.53), 1953-1956, and IV instar larvae 13.ix.53, *EWG* (24); 2.x.39, *FJC* (SL); ix. *DL* (34); 11.viii.69, 1.ix.69 and 4.ix.65, *PSB* (16); Oxshott Heath, 20.vii.52, *DL* (HD) (EMM **87:** 244); 8.xi.35, *FJC* (SL); 24.viii.52, *WJLeQ* (21); Esher Common, 4.viii.1889, *EAN* (C); 4.x.48, *FJC* (SL); *DL* (EMM **87:** 244); West End Common, 28.viii.50, *FJC* (SL); Ockham Common, 23.viii.48, *FJC* (SL); Weybridge, 22.ix.63, *PSB* (16): and on the boundary at Wisley, 26.ix.11, sweeping round a small lake, *WW* (60); 12.iv.48, *FJC* (SL); Byfleet, 28.vii.41, *FJC* (SL); Lane by Goldstone Farm, N.W. of Polesden Lacy, 8.ix.56, on flowerhead of *Linaria vulgaris*, *EWG* (24); and beyond at Chobham, 1874, *ES* (HD); viii.1874, *ES* (HD); 29.vi.1895, *AJC* (HD); 17.vii.1891, *AJC* (HD); Woking, viii.1888, *ES* (HD); 19. & 26.viii.49, *FJC* (SL); Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Abinger, viii.1899, *EAB* (BM); Effingham, 7.ix.34, *FJC* (SL); Ewhurst, viii.1889, *EAB* (BM); Chilworth, 14.x.15, *ECB* (NM); and Camberley, viii.33, *EEG* (BM).

BUCKS. On the boundary at Fulmer, 30.viii.53, *WJLeQ* (21); Datchet (Ditton Park), various dates, *GEW* (40); just over the boundary at Slough (PILG), various dates, *GEW* (40); (Upton Court Road) 1953-54, on waste plot, plentiful, *GEW* (33d); Chesham, 6.vii.53, *WJLeQ* (21); (White End Park), 20.vii.66, *WJLeQ* (21); Amersham, 23.viii.52, 4.ix.50 and 22.x.50, *WJLeQ* (21); Hodgemoor Wood, 11.x.52, *WJLeQ* (21); and beyond that at Burnham Beeches, viii.1893, *EAB* (BM); 21.viii.54, *WJLeQ* (21); South Heath, north of Gt Missenden, 15.x.50, *WJLeQ* (21); Wendover, 21.viii.55, *C. I. Carter* (HD); and Coombe Hill, 19.iv.53, *WJLeQ* (21).

Liocoris tripustulatus (Fab.) Sp. 358 p. 277
D&S p. 450 S p. 259 B p. 437 (Sp. 313)

Very common. Recorded from all the Home Counties where it occurs throughout the summer months wherever a large colony of stinging nettle (*Urtica dioica*) may be growing. The adult is mainly a plant feeder attacking the stems, flowers and fruit of the host plant. Allan (EMM **95:** 268) has also found it breeding on cultivated mints (*Mentha* spp.).

MIDDX. Cripplegate bombed sites, City of London, 26.v.56 ♂ & ♀, on *Parietaria officinalis*, 18.vi.55 and 23.vii.55 ♀; 23.vii.55 V instar nymphs; 28.vii.56, nymphs, *EWG* (24); Hampstead, 23.v.1890, *EAN* (C); 27.x.45, *CHA* (17); Hampstead Heath, 1949, very common and

widespread, *DL* (1/**1949-50,** 36-38); 5.viii.60, *DL* (HD) (54); Muswell Hill, viii.20, *EAB* (BM); Finchley, 18.iv.43, *CHA* (17); Southgate, 21.ix.1879, *EAN* (C); Enfield, 6.iv.05, *HStJKD* (HD); Hendon, 31.v.1897, in hedges at side of Reservoir, *EAN* (C); Edgware (Scratch Wood), 22. & 23.vii.60, adults and larvae, *DL* (HD) (54) (EMM **97:** 68); Ruislip, 7.viii.44, on *Urtica*, *CHA* (17); Ruislip Local Nature Reserve, 21.v.56, 24.vii.56 ♂ & ♀, 1.ix.55 and 19.ix.56 ♂, *EWG* (24); vi.64 common nettle, *RAPM* (49); Harefield, 22.viii.16, *EAB* (BM); West Drayton, *FPP* (HD presented 1909); Boston Manor, 6.viii.40 *HStJKD* (HD); and Hounslow Heath, 22.ix.52, *GEW* (54).

HERTS. Abundant and widely distributed throughout the county, on *Urtica*, hibernates as imago, *DCT* (12); Barnet, viii.1885, *EAB* (BM); Bushey, n.d., *CHA* (17); Watford (Cassiobury Park), 1.iii.69, *PSB* (16); Rickmansworth, viii.16, V instar nymph, *EAB* (BM); Chorleywood, 27.v.63, *PSB* (16); Radlett, 26.v.60, *DC* (54) (HD); Bricket Wood Common, 17.ix.60, on hazel, *DL* (54); 29.viii.64, *PLJR* (MM); Cheshunt Marshes, Lea Valley, often common, *AAA* (51); Hatfield, 19.vii.64, *PLJR* (MM); and Broxbourne, 1963, *BSN* (58). Just on the boundary at Harpenden (Rothamsted Expt. Stn. grounds), 21.iv.53, *TRES* (1/**1953-54:** 4); various dates in 1954-55, *GGES* (HD); and beyond at Standen, 1963, *BSN* (58); and Rye Meads, 1963, *BSN* (58).

ESSEX. Waltham Abbey, 16.vii.63, *PSB* (16); Epping Forest, (Fairmead), n.d., *CN* (35a); (Theydon Bois), vii.22, *EAB* (BM); Woodford, 5.viii.25, V, IV, III & II instar larvae, *EAB* (BM); and Grays, 2.x.55, *KCS* (14).

KENT. Blackheath (63 Blackheath Park), ix.59 and 24.ix.61, several off mint in flower in garden, 'on which it appears to breed as well as on nettle', *AAA* (51) (EMM **95:** 268); Abbey Wood marshes, 24.vii.54, *EWG* (24); Erith Marshes (part near Slade Green), 16.x.59, under nettles on hedgebank, *AAA* (51); Lee, *WW* (4) (39); Hither Green Lane, Lee, 8.ix.1894, *WW* (SL); Kidbrooke, 1893, on nettles, *WW* (60); Kidbrooke Lane, 25.vii.1896, in elm hedges, *WW* (60); Birdbrook, *JAP* (BM); Lewisham, 15.iii.1893, *AJC* (HD); *WW* (4) (39); Foots Cray (Ruxley Gravel Pit), 26.vi.61 and 8.vii.67, *KCS* (14); Crayford, 14.vi.55, *KCS* (14); Dartford, 2.x.1890, *D&S* (C); Greenhithe, *FPP* (HD presented 1909); Swanscombe, 9.v.64, *KCS* (14); Wilmington, 1.i.56, *KCS* (14); Darenth, 1893, *AJC* (HD); *JAP* (BM); Longfield, 15.vi.56 *GGES* (HD); Horton Kirby, 9.iv.55, *KCS* (14); 17.ix.66, *PJC* per *KCS* (14); Farningham, 25.v.63, *PLJR* (MM); Farningham Wood, 11.iii.56, *KCS* (14); Eynsford, 11.viii.24, *FJC* (SL); Bromley, 17.ix.66, *PJC* per *KCS* (14); West Wickham, 13.viii.1898 and 17.ix.1898, on nettle *WW* (60); and Westerham (Tower Wood), 17.vi.51, *DL* (1/**1951-52:** 72). On the boundary at Gravesend, 10.viii.46, sweeping nettles at dusk, *TRES* (13); 22.vii.52, *GGES* (HD).

SURREY. Kew Gardens, 14.ix.59, a single specimen in the Herbarium, *P. F. Hunt* (7/**1961:** 180); Putney, 18.vii.1883, on *Onopordon*, *EAN* (C); Sheen Common, 16.vi.65, *PSB* (16); Wimbledon Common, 25.vi.55, *EWG* (24); Merton, v.1880, *EAN* (C); Mitcham, 9.ix.1892, on nettle, *EAN* (C); Cheam (Nonsuch Park), 22.vii.55, ♂ ♂, ♀ ♀, & V instar larvae, *EWG* (24); Beddington Sewage Farm, 11.viii.55, *EWG* (24); Shirley, 1893, *WW* (SL) (62); Chipstead, 1.vi.36, *ECB* (NM); Banstead Downs (Carshalton end), various dates, *AAA* (51); Banstead Heath, 3.ix.62, *PSB* (16); Reigate, n.d., *GBR* per *FJC* (62); iv.24 *ECB* (NM); Redhill (prior to 1867), by sweeping, *J&TL* (32); Mickleham Downs, viii.1897, *WJA* (60); *FJC* (62); Box Hill, 22.vii.40, *FJC* (SL) (62); *WW* per *FJC* (62); 24.vi.51, *DL* (1/**1951-52:** xvi); 10.viii.35, *ECB* (NM); Epsom Common, 6.ix.53, *EWG* (24); Ashtead, 26.viii.46, *FJC* (SL) (62); Bookham Common, 2.x.37, *FJC* (SL) (62); 19.vii.53, adult & V instar larva on *Symphytum*, 16.viii.55, adult ♂ & ♀ and V instar larva, 26.ix.55 adult ♀ ♀, 13.ix.53, IV instar larva, *EWG* (24); 31.vii.69, 5. & 11.viii.69, and 1.ix.69, *PSB* (16); viii, ix, and x, *DL* (34); various dates, *AAA* (51); Oxshott Heath, 30.iv.38, *FDB* (SL) (62); West End Common, 20.viii.51 and 25.viii.52, *FJC* (SL); Arbrook Common, 19.v.52, *FJC* (SL); and Weybridge, 30.vi.63 and 14.ix.69, *PSB* (16). On the boundary at Effingham, 2.iv.49, *SL* (1/**1949-50:** 70); near Effingham, 1.vi.68 and 25.viii.68, *PSB* (16); and Wisley Common, 24.iv.65, *PSB* (16); and beyond at Chobham, 29.ix.92, *AJC* (HD); Horsell, 6.ii.31, under dead leaves, *FJC* (SL) (62); Woking, 1.ix.41, *FJC* (SL) (62); viii.1888, *ES* (HD); Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Abinger Hammer, 11.v.12, *EAB* (BM); Gomshall, viii.1895, *EAB* (BM); Clandon 21.v.60, *DL* (HD); Albury, viii.1860, *EAB* (BM); St Martha's, Chilworth, 16.v.31, *FJC* (1/**1931-32:** 56) (52); and Chiddingfold, 16.viii.36 and 22.viii.37, *ECB* (NM).

BUCKS. Just over the boundary at Latimer, 5.ix.50, *WJLeQ* (21); Chesham (Cowcroft Wood), 4.ix.65, on nettle, *WJLeQ* (21); Amersham, 11.viii.56, *WJLeQ* (21); Slough (ICBFS), 24. & 29.v.33, 16., 19. & 30.vi.33 and 3., 6. & 21.vii.33, on *Urtica dioica*, *WHG* (41); and beyond at Burnham Beeches, 22.vi.12, *EAB* (BM).

Orthops rubricatus (Fall.) Sp. 360 p. 278
D&S p. 462 (*Lygus rubricatus*) S p. 254 (*L. rubricatus*)
B p. 421 (Sp. 300, *L. rubricatus*)

Very local. Occurs on spruce trees (*Picea* spp.), more rarely on pine (*Pinus* spp.), overwintering in the egg stage. Adults may be taken by beating the foliage from July to September. Middlesex and Essex records wanting.

HERTS. Barnet, viii.1885, *EAB* (BM) (37); Bushey, *JAP* (BM); Chorleywood, 11.viii.16, *EAB* (11) (12); and just over the boundary at Harpenden (Rothamsted Expt. Stn. grounds), 3.viii.54, *GGES* (HD).

KENT. Bostall Woods, 1895, *WW* (39); Darenth, *GCC* (4) (37); Bromley, *ES* (4) (37); and West Wickham, 13.viii.1898, on pines, *WW* (60).

SURREY. Streatham, 9.vii.62, *PSB* (16); Shirley, *D&S* per *FJC* (62); Surbiton, viii.1892, *ES* (HD); Banstead, 16.vi.1900, *SL* (1/**1900:** 14) Reigate, *ES* (3) (37); Headley Lane, *WW* in *PH* coll. (BM); Box Hill, 13.viii.1898, on spruce fir, *WW* (60) (62); Mickleham, *JAP* (BM) (C); *GCC* (3) (37); Bookham Common, 6.viii.1895, on pines, *WW* (60) (62); Weybridge, vii.19, *HStJKD* in *EAB* coll. (BM); and beyond the boundary at Chobham, vii.1892, *ES* (HD); 29.vi.1895, *AJC* (HD); *GCC* (3); Woking, vii.1890, *ES* (HD) (3); Gomshall, *EAB* (3); Shere, viii.1892, *EAB* (BM) (3); Shalford, *EAB* (3); Milford, 13.vii.63, *PSB* (16); and Hurst Green, viii.1882, *EAB* (BM).

BUCKS. Langley Park, 5.vii.56, on spruce, *GEW* (40); and just over the boundary at Amersham, 23.ix.51, on spruce, *WJLeQ* (21) (HD); Slough (ICBFS), 5. & 12.vii.34 and 7. & 12.vii.33, on *Abies* sp., *WHG* (41); (PILG) various dates, *GEW* (40); and beyond at Burnham Beeches, 22.vi.12, adult and IV instar larva, *EAB* (BM); and Wendover, 1.viii.54, on spruce, *WJLeQ* (21).

Orthops cervinus (H.—S.) Sp. 361 p. 278
D&S p. 454 S p. 254 (*Lygus cervinus*)
B p. 423 (Sp. 302, *L. cervinus*)

Occasional. Associated with various trees including lime, ash, hazel, elder and box; sometimes also on ivy. Eggs are laid in June by the overwintering females, and the first generation become adult by early August. The larvae from the summer generation reach maturity by the end of the first week in September. A. A. Allan (pers. comm.) has found it at Blackheath, Kent, to be one of the most constant bugs to visit the MV light trap from spring to late autumn. Essex records wanting.

MIDDX. Buckingham Palace grounds, 1961, on birch and hazel, and also taken at light (July), *TRES* (52); Euston Rd., N.W.1, 23.ix.49, *DL* (HD) (54); St John's Wood (Finchley Road) N.W.8, 16.vii.60, 30.vii.60 and 11.viii.60, adults, on *Tilia*, *DL* (HD) (54); Finchley, 12.vii.43, on *Cotoneaster*, *CHA* (17); Mill Hill, 5.viii.58, *DL*; Ruislip LNR, 9.viii.64, a single adult on ash, RAPM (49); Harefield, 26.vii.51, on *Salix*, *WJLeQ* (21); Hampstead Heath, 24.vi.49, near Jack Straw's, *DL* (SL) (54) (1/**1949-50:** 36-38); 18.vii.43, on *Tilia*, *CHA* (17); Hounslow Heath, 8.viii.53, common and generally distributed on trees, *GEW* (54) (33c).

HERTS. Barnet, viii.1885, *EAB* (BM); Elstree, 5.vii.58, *DL* (SL); Rickmansworth, 8.viii.34, on *Corylus*, *DCT* (12); Bricket Wood Common, 17.ix.60, ♀ ♀, on *Corylus*, *DL* (54) (HD); 3.vii.56, nymph, *EWG* (24); Cheshunt, 14.ix.12, *EAB* (BM); and just over the boundary at Kings Langley, x.14, *WJA* (SL); Harpenden, viii.37, abundant on

Tilia, and 8.viii.37, a few on *Corylus*, *DCT* (12); 1933-36, taken in light trap in Rothamsted Expt. Stn. grounds, *DCT* (59); and beyond at Herts. Beacon, vii.36, sheltering in wet weather on *Buxus*, *DCT* (12).

KENT. Blackheath, *WW* (4) (39); 19.vii.1895, *AJC* (HD); Blackheath (63 Blackheath Park), common at MV light from spring to late autumn; occasionally in numbers on golden rod (*Solidago virgaurea*) in garden (e.g. 26.vii.68); also on ivy (*Hedera helix*) from late Sept. to early Oct.; often on *Fraxinus* (e.g. 28.viii.59, several) and *Buxus* (EMM **96:** 218)—all records of *AAA* (51); Lewisham, 19.vi.1891 and 23.vii.1893, *AJC* (HD); 9.viii.1896, *WW* (60) (39); Dartford, 14.vii.64, *KCS* (14); Farningham Wood, 27.v.56, nymph, *EWG* (24); and beyond the boundary at Higham, 23.viii.64, *KCS* (14).

SURREY. Wand[sworth], vii.1875, *ES* (HD); Kew Gardens, 13.vi.51, in the Herbarium, probably brought in from the Gardens on clothes, *HKAS* (7/**1952,** 285); Surb[iton], viii.1892, *ES* (HD); Shirley, 13.v.1893, beaten off oak, *EAN* (C); Godstone 20.viii.66, *KCS* (14); Redhill & Reigate, 23.x.1897, on whitethorn, *WW* (60) (62); Mickleham, *JAP* (BM) (62); Headley Lane, 8.x.1897, *WW* (60) (62); 6.viii.24, *HStJKD* (HD); Box Hill, 29.viii.1896, *WW* (60); 26.vi.1897, beating *Buxus*, *WW* (60); 27.v.16, on *Buxus*, *EAB* (BM) (38); x.11., beating *Taxus*, *WW* (60); 3.viii.36, 7. & 29.viii.37, 13.ix.39 and 17.ix.28, *ECB* (NM); 29.vii.49 and 4.viii.49, *FJC* (SL); 22.ix.51, *DL* (HD) (SL); 2.x.49, *DL* (SL); ix.57, on *Buxus*, *GEW* (40); 24.ix.59, a single adult on *Fraxinus*, *AAA* (51); Ranmore Common, 15.x.50, *FJC* (SL) (1/**1950-51:** 81) (62); Prince's Coverts, 16.vi.52, *FJC* (SL); Esher Common, 10. & 17.ix.51, *FJC* (SL); *JAP* (BM); Oxshott Heath, 8.x.51, *FJC* (SL); and on the boundary at Wisley Common, *WW* per *FJC* (62); Egham, 12.viii.55 (on sallow) and 19.ix.54 (on ivy), *GEW* (40); Effingham, 22.vii.49, *FJC* (SL) (62); and beyond at Gomshall, *JAP* (BM); Clandon, 21.v.60, *DL* (HD); Albury, 21.viii.41, *ECB* (NM); and Ewhurst, viii.1889, *EAB* (BM).

BUCKS. Horton, 12.ix.54, on ash, *GEW* (40); and just beyond the boundary at Datchet (Ditton Park), vii.55, on *Tilia*, *GEW* (40); Amersham, 14. & 20.ix.52, on *Fraxinus*, and 22.viii.53 on *Tilia*, *WJLeQ* (21); Slough (ICBFS), 12.ix.54, on *Hedera helix*, *WHG* (41); (PILG), on ash and ivy, various dates, *GEW* (40).

Orthops viscicola (Puton) Sp. 362 p. 279
S p. 252 (*Lygus viscicola*) B p. 424 (Sp. 303, *L. viscicola*)

Rare. Associated with mistletoe partially parasitic on various deciduous trees especially apple and lime (*Tilia* spp.). Both adults and larvae, which are found from late June to September, feed on the leaves and berries of the mistletoe. So far it has been recorded from only two counties in the Society's London Area.

SURREY. Just beyond the boundary at Chobham, 1897, *WW* (60).

BUCKS. On the boundary at Datchet (Ditton Park), 24.vi.55, taken on lime flowers though mistletoe was growing higher up the tree, *GEW* (40); and just beyond at Amersham, 2.viii.54, on lime 'there was mistletoe at top of tree but bug came down to feed on the lime flowers' [*sic.*] *WJLeQ* (21) (EMM **1954:** 256).

Orthops campestris (Linn.) Sp. 363 p. 279
D&S p. 463 (*Lygus campestris*) & p. 455 (*Orthops pastinaceae*)
S p. 257 (*L. pastinaceae*)
B p. 425 (Sp. 304, *L. pastinaceae*)

Common. This species is found on several species of the plant family Umbelliferae particularly the wild carrot (*Daucus carota*), hogweed (*Heracleum sphondylium*) and the wild parsnip (*Pastinaca sativa*). Both larvae and adults feed on the flower buds, leaves and unripe seeds of their host-plant, on which they may be found from June until August. Essex records wanting.

MIDDX. Cripplegate bombed site, City of London, 28.viii.56, V & IV instar larvae, *EWG* (25); Hampstead Heath, *JAP* (BM); 27.viii.49, *DL* (54) (1/**1949-50:** 36-38); Finchley, 31.vii.43, on *Heracleum*, *CHA* (17); Ruislip LNR, 29.vii.55, ♂♂ & ♀♀ plentiful, *EWG* (49); 9.viii.64 abundant on Umbellifers, *RAPM* (49); Osterley, 16.iv.49, *B. P. Moore* in *WJLeQ* coll. (21); Hounslow Heath, 5.v.53, common and generally distributed amongst rank vegetation, *GEW* (54) (33c); 9.viii.53, DL (54) (HD).

HERTS. Barnet, viii.1885, *EAB* (BM); Aldenham, 23.vii.61, *DL* (HD) (54); Chorleywood, 16.viii.16, *EAB* (BM); Cheshunt Marshes, Lea Valley, 9.vi.68, *AAA* (51); and just over the boundary at Harpenden, 1933-36, taken in light trap in Rothamsted Expt. Stn. grounds, *DCT* (59); Redbourn, 23.vii.60, *DL* (54); and beyond at Royston, 29.v.09, *EAB* (BM); Royston Heath, 31.vii.19, *GEH* (BM); and Wymondley, viii.1880, *EAB* (BM).

KENT. Blackheath, 10.vii.62 and 5.ix.96 (many brownish examples) on, or more often under, the flower heads of hogweed and wild parsnip. *AAA* (51); Shooters Hill, 4.viii.1900, by sweeping, *WW* (60); Plumstead, 11.viii.1894, *AJC* (HD); Abbey Wood, 30.vii.1895, *WW* (60) (4) (39); Abbey Wood (north of the railway), 3.vii.62, several examples, *AAA* (51); Abbey Wood marshes (Erith Marshes), 24.vii.54 and 31.viii.55, *EWG* (24); Lee, *WW* (39); Kidbrooke, vi.16, *WW* (60); Foots Cray (Ruxley Gravel Pit), 26.iv.63 and 8.vii.67, *KCS* (14); Darenth Wood, 6.vii.55 ♀, *EWG* (24); Horton Kirby, 7.v.59, *KCS* (14); Farningham Wood, 2.vii.61, *KCS* (14); Eynsford, 15.vii.37, *FJC* (SL); West Wickham Wood, 21.ix.1895, on holly, *WW* (60); Otford, 30.ix.22 *PH* (BM); Otford Chalkpit, near the station, 29.viii.57 and 3.viii.61 (2 examples by grubbing), *AAA* (51). On the boundary at Gravesend, 16.viii.51, on nettles, *TRES* (13); and beyond at Higham marshes, 26.viii.65, *KCS* (14).

SURREY. Hammersmith Bridge, *JAP* (BM); Kew Gardens, 1.viii.46, on *Heracleum* by herbarium, *HKAS* (7/**1948,** 113-124); Wandsworth, S.W.18, 7.ix.58, on flower heads (compositae), *MAP* (BM); Wimbledon Common, n.d. (but probably July 1883), sweeping nettle on banks of Beverley Brook, *EAN* (C); 20.vi.1897 and 7.vii.1897 on Umbelliferae, *EAN* (C); Merton Park, S.W.20, 12.v.47, *FJC* (SL) (62); Shirley, *FPP* (HD presented 1909); Sanderstead, *D&S* per *FJC* (62); Selsdon, 15.xi.48, *RCHS* (BM); Coulsdon, 12.viii.23 *ECB* (NM); Banstead Downs (Carshalton end), various dates, *AAA* (51); Caterham (Pilgrim Fort), 3.ii.68, under loose bark, *KCS* (14); 9.v.70, sweeping at edge of wood by springs in Perkins Bottom, *KCS* (14); Tilburstow Hill, 7.xi.59, *KCS* (14); Redhill, (prior to 1867), by sweeping, *J&TL* (32); Mickleham, *D&S* per *FJC* (62); Headley, v.1888, on nettles, *ES* (HD); Headley Lane, 3.iv.1899 and 8.x.1897, *WW* (60) (62); 8.ix.16, by sweeping, *n.c.* (SL); Box Hill, 15.vii.1893, *AJC* (HD); x.11, beating yew, *WW* (60) (62); 4.vii.40, *FJC* (SL); 24.ix.59, a few examples, *AAA* (51); Ashtead, 15.vi.48, 2.ix.46, 13.ix.48, and 30.ix.48, *FJC* (SL) (62); Bookham Common, 6.viii.1895, on alders, *WW* (60) (62); 29.vii.50, *DL* (1/**1950-51,** 76); 9.ix.51, *WJLeQ* (w1); 8.v.55, ♂♂ & ♀♀ abundant on *Conium maculatum*, *EWG* (24); 14.xi.54 adult ♀ hibernating inside dead stalk of *Conium* on I.O.W. Plain, *EWG* (24); 27.viii.55, adults and nymphs, *EWG* (24); 27.v.60, *DL* (HD); 31.vii.69, 5.viii.69, 11.viii.69 and 1.ix.69, *PSB* (16); vi, vii, viii, and ix, *DL* (34); Esher Common, 13.viii.51, *FJC* (SL); West End Common, 6.v.52 and 21.vii.52, *FJC* (SL). On the boundary at Effingham, *FJC* (62); and beyond at Woking, v.1888, *ES* (HD); 19. & 26.viii.49, *FJC* (SL) (62); Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Abinger Hammer, 11.v.12, *EAB* (BM); Shere, 25.v.1888, beaten off hedges, *EAN* (C); Shalford, viii.1886, *EAB* (BM); Ewhurst, *FJC* (62); St Martha's, Chilworth, *FJC* (62); and Chiddingfold, 16.viii.36 and 22.viii.37, *ECB* (NM).

BUCKS. Just over the boundary at Chesham, 19.vii.59, on *Salix purpurea*, *WJLeQ* (21); Amersham, 15.xi.52, *WJLeQ* (21); Datchet (Ditton Park), viii.54, *GEW* (40); Slough (ICBFS) 26.vi.34 and 3.vii.34, on *Heracleum sphondylium*, *WHG* (41); (PILG), 26.vii.55, on apple, *GEW* (EMM **92:** 35 and **90:** 40); on Umbelliferae at various dates, *GEW* (40).

Orthops kalmi (Linn.) Sp. 364 p. 280
D&S p. 452 S p. 253 (*Lygus kalmi*)
B p. 426 (Sp. 305, *L. kalmi*)

Rare and local. Like the last species it is also associated with umbelliferous plants on which the adults may be found from late July to early October. It overwinters in the egg stage.

MIDDX. Hampstead Heath, 8.x.49, *DL* (SL); Hounslow Heath, 22.ix.52, *GEW* per DL (54).

HERTS. Occurring about a week earlier than *Orthops campestris* *DCT* (12); Barnet, viii.1885, *EAB* (BM); St. Albans, viii.1885, *EAB* (BM); Chorleywood, 11. & 16,viii.16, *EAB* (BM); and on the boundary at Harpenden (Rothamsted Expt. Stn. grounds) 1933-36, taken in light trap, *DCT* (59); 23.vii.55, in light trap, *n.c.* (HD); and beyond at Royston, 14.v.10, *EAB* (BM); and Wymondley, viii.1880, *EAB* (BM).

ESSEX. Benfleet, 15.ix.57, *DL* (SL).

KENT. Abbey Wood marshes (Erith Marshes), 24.vii.54, three adults by sweeping, *EWG* (24); Lewisham, ix.1890, *AJC* (HD); Darenth Wood, 28.v.1893, *AJC* (HD); Shoreham *FPP* (HD presented 1909); and Otford, 30.ix.22, *PH* (BM).

SURREY. Merton, 9.ix.1892, on nettle, *EAN* (C); Coulsdon, 16.vii.10, *ECB* (NM); Caterham, 10.v.1899, *AJC* (HD); Oxted, 11.vi.1893, *AJC* (HD); Redhill (prior to 1867) by sweeping, *J&TL* (32); Headley, v.1888, on nettle, *ES* (HD); Box Hill, 2.x.55, *EWG* (24); Mickleham, *JAP* (BM); Ashtead, 2.ix.46, *FJC* (SL); Bookham Common, 6.viii.1895, by sweeping *WW* (60) (62); 29.vii.50, *DL* (1/**1950-51**: 76); 16.vi.57, V, IV, III, II & I instar larvae, *EWG* (24); vii & ix, *DL* (34); Esher Common, 30.vii.51, *FJC* (SL); and on the boundary at Effingham, 11.iv.36, *FJC* (SL); and beyond at Chobham, vi.1892, *ES* (HD); 31.v.1891, *AJC* (HD); Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Guildford, 23.v.41 and 28.vi.41, *ECB* (NM); Abinger Hammer, viii.1899, *EAB*; 11.v.12, *EAB* (BM); Gomshall, 23.ix.51, *FJC* (SL); Shere vii.1893, *EAB* (BM); 25.v.1888, beaten out of hedges, *EAN* (C); Shelford, viii.1886, *EAB*; and Chiddingfold, 22.viii.37, *ECB* (NM).

BUCKS. Just over the boundary at Slough (ICBFS), 16.viii.33, ♂ taken on *Daucus*, *WHG* (41); (PILG) n.d., *GEW* (40) and beyond at Ivinghoe, 8.viii.54, *WJLeQ* (21).

Lygocoris pabulinus (Linn.) Sp. 365 p. 281
D&S p. 457 (*Lygus pabulinus*) S p. 249 (*L. pabulinus*)
B p. 413 (Sp. 293, *L. pabulinus*)

Abundant. This species has two generations a year. Adults of the summer, occurring from June onwards, are associated with a variety of herbaceous plants including *Cirsium arvense*, *Senecio vulgaris*, *Urtica dioica*, *Solanum dulcamara*, *Chenopodium album*, *Chamaenerion angustifolium*, *Taraxacum* spp., etc. The sexes pair in late June to July and the newly hatched larvae feed up on the summer host plants. By the end of August until October matured adults of this second generation move to winter host plants (woody) such as lime, hawthorn, apple and cherry. Eggs are laid on the bark of the younger twigs and overwinter in this state on the host tree.

MIDDX. Buckingham Palace grounds, 1961, on various plants near greenhouses, and also at light (September), *TRES* (52); Regent's

Park, 4.vii.42, *PJLR* (20); Cripplegate bombed sites, City of London, 28.vii.56, IV instar larvae, *EWG* (24); St John's Wood (Finchley Road) N.W.8, 5.viii.61 and 3. & 8.ix.60, adult ♂♂ & ♀♀ abundant on foxgloves and garden weeds, *DL* (54) (HD); Hampstead Heath, 1.vii.1882, *EAN* (C); 1949, *DL* (1/1949-50: 36-38); Finchley, 25.v.43 and 29.vii.43, on *Chenopodium*, *Urtica* and *Salix*, *CHA* (17); Edgware (Scratchwood), 22.vii.60 *DL* (54) (HD); and Stanwell, *FPP* (HD presented 1909); Ruislip Local Nature Reserve, various dates between 1955-1958, adults, V & IV instar larvae, common *EWG* (24).

HERTS. Whetstone, 23.vi.60 ♀, 29.viii.60 ♂ & ♀, and 1. & 4.ix. 60 ♀♀, taken in MV light trap, *PHW* (*pers. comm.*) (47); Boreham Wood, 18.ix.60, on nettle, *DL* (64) (HD); Chorleywood, *EAB* (11); Radlett, 26.vii.60, *DL* (54); 10.viii.48, *DL* (54) (HD); Bricket Wood Common, 17.ix.60, on hazel, *DL* (54); 3.vii.56 adults, common, *EWG* (24); Potters Bar, 11.x.65, ovipositing on blackcurrant bush, *n.c.* (BM); Hatfield, 6.vi.64, *PLJR* (MM); Bayfordbury, 30.vii.57, *DL* (54); and on the boundary at Harpenden, various dates vii-viii.54 and vi.-viii.55, *GGES* (HD).

ESSEX. Epping Forest, generally distributed, *CN* (35a); 20.vi.64, *PLJR* (MM); (Loughton), 29.vi.1883 ♀, by sweeping, *EAN* (C); (Woodford), 5.viii.25, V, IV, III & II instar larvae, *EAB* (BM); (Buckhurst Hill), 18.viii.1895, *EAB* (BM).

KENT. Blackheath (63 Blackheath Park), common most years; 2.vi.58, "nymphs noted as common all over the garden, all becoming adult a week later, occurring on both low herbage and in trees; very rare at MV light (singly, 8.viii.59, 1.vii.69 and perhaps one or two others)", *AAA* (51); Charlton, 9.ix.58, only found in damper corner of a large area of waste ground and on the hedges, not in the drier more open part, *AAA* (51); Plumstead, 23.viii.56, *RGR* (WBM); Abbey Wood, 19.viii.56, on *Nasturtium*, *RGR* (WBM); common, various dates, *AAA* (51); Lee (Hither Green Lane), 5.ix.1896, on nettles, *WW* (60) (4) (39); Lewisham, *WW* (4) (39); Catford, x.09, on nettles, *WW* (60); Eltham, 13.x.07, *HStJKD* (HD); Foots Cray (Ruxley Gravel Pit), 8.vii.67, *KCS* (14); Greenhithe, *FPP* (HD presented 1909); Dartford, 13.ix.1890 *D&S* (C); Darenth, 6.ix.1890, *D&S* (C); Fawkham, 27.vii.56 *GGES* (HD); Farningham Wood, 21.vi.59, 23.vi.62 and 2.vii.61, *KCS* (14); Chislehurst, 30.vi.68, *KCS* (14); Bromley, 13.vi.66, *PJC* per *KCS* (14); West Wickham Wood, 21.ix.1895 on nettles, *WW* (60); Shoreham, 1.ix.61, *KCS* (14); and Westerham, 11.ix.67, on Downs to the north of the town, *KCS* (14); 24.vii.60, several specimens seen, *AAA* (51).

SURREY. Kew, *FPP* (HD presented 1909); Wimbledon Common, 25.vi.55, *EWG* (24); 7.vii.1897, by sweeping, *EAN* (C); Surbiton, vii.1892, *ES* (HD); Streatham, 2.vii.62, on *Mentha* beneath apple tree, *PSB* (BM) (16); Carshalton, 4.ix.52, adult on window sill of house in Carshalton Park Road, *EWG* (24); 2.vii.54, adult with

rostrum sunk into tissues of *Asparagus* in garden of house in Carshalton Park Road, *EWG* (24); Beddington Sewage Farm, 11.viii.55, V instar nymph, *EWG* (24); Croydon, *FPP* (HD presented 1909); Sanderstead, *D&S* per *FJC* (62); Warlingham, 29.viii.64, *KCS* (14); Banstead Downs, 23.viii.55, V instar nymph, *EWG* (24); Banstead Heath 3.ix.62, *PSB* (16); Coulsdon (Farthing Downs), 4.vii.54, *EWG* (24) (EMM **90,** xxxix); Riddlesdown, 20.vi.53, V instar nymph, *EWG* (24); Reigate, 16.ix.51, in shrubbery, *GBR* (45) (62); Walton on the Hill, 6.ix.64, *KCS* (14); Mickleham Downs, *JAP* (BM); *FPP* (HD presented 1909); *FJC* (62); Box Hill 18.vii.1892, *AJC* (HD); *WW* per *FJC* (62); 9.vi.17, II instar larva, *EAB* (BM); 27.viii.50 on *Tanacetum*, *DL* (1/**1950-51:** 77); 24.ix.59, a single specimen on *Fraxinus*, *AAA* (51); Claygate, *JAP* (BM); Epsom Common, 6.ix.53, *EWG* (24); Bookham Common, 8.vii.56, 10.vii.55, 12.viii.56 ♂ & ♀, 16.viii.55 ♂ & ♀, 26.ix.55 ♀ ♀, 21.vi.55 V instar nymph, and 14.vi.53 III instar nymph, all records of *EWG* (24); vii. and viii, *DL* (34); *WW* per *FJC* (62); Oxshott Heath, 30.vi.51, *FJC* (1/**1951-52:** 73); various dates, common, *AAA* (51); Esher Common, 2.ix.50, *DL* (1/**1950-51:** 79); 21.viii.54, *EWG* (24); *FPP* (HD presented 1909); Arbrook Common, *FJC* (62); Weybridge 14.ix.68, *PSB* (16); and Chertsey, *FPP* (HD presented 1909). On the boundary at Egham, 19.ix.54, on *Filipendula ulmaria*, *GEW* (40); and beyond at Byfleet, *FJC* (62); Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); and Gomshall, viii.1892, *EAB* (BM).

BUCKS. On the boundary at Little Chalfont, 4.vii.53, *WJLeQ* (21); Datchet, various dates, in garden on raspberries, *GEW* (40); just over the boundary at Amersham, 7.vi.52 and 2.ix.51 (on spruce), and 4.ix.50, *WJLeQ* (21); and Slough (ICBFS), 9. & 15.vi.34, on *Ribes nigrum*, *WHG* (41); (PILG), 26.vii.55, on apple, *GEW* (EMM **92,** 35); various dates on meadowsweet, *GEW* (40); and beyond at Oakley Wood, 26.vi.57, *GGES* (HD); Turville Heath, 18.vii.65, *WJLeQ* (21); and Ivinghoe, 23.vi.57, *WJLeQ* (21).

Lygocoris viridis (Fall.) Sp. 366 p. 282
D&S p. 461 (*Lygus contaminatus*) S p. 250 (*L. viridis*)
B p. 414 (Sp. 295, *L. viridis*)

Local. Found mainly on lime (*Tilia* spp.) though occasionally on oak, alder and alder buckthorn (*Frangula alnus*). Adults occur from June to September feeding on the flowers and fruits of the host trees.

MIDDX. St John's Wood (Finchley Road), N.W.8, 16.vii.60 (on *Tilia*), 13. & 15.vii.61, and 8.viii.61 (on *Tilia*), *DL* (HD) (54); Hampstead Heath, 1949, *DL* (1/**1949-50:** 36-38); Edgware, 10.vii.48, *CHA* (17); (Scratch Wood), 22.vii.60, *DL* (54); Ruislip Local Nature Reserve, 27.vi.55 ♀, 24.vii.56 ♀, and 29.vii.58 ♀, *EWG* (24); 18.vii.64, a single adult taken on ash, *RAPM* (49); Uxbridge, 20.vi.33, common on *Tilia*, *DCT* (33a); and Ealing, vi.-vii.37, abundant on *Tilia*, *DCT* (33a).

HERTS. Barnet, viii.1885, *EAB* (BM) (37); Cheshunt, 29.viii.18, *EAB* (BM); Haresfoot, near Berkhamsted, 19.vii.59, on lime, *WJLeQ* (21); and on the boundary at Harpenden, 11.viii.37, abundant on *Tilia*, *DCT* (12); 1933-36, taken in light trap in Rothamsted Expt. Stn. grounds. *DCT* (59); and Redbourn, 23.vii.60, *DL* (54).

ESSEX. Epping Forest (Chingford), 15.vii.11, *EAB* (BM).

KENT. Blackheath, fairly common most years on trees and bushes—lime (e.g. 12.vii.59), ash, plum (e.g. 15.vii.59, a few), apple (e.g. 30.vii.59) and beech, scarcer in 1962. One on raspberry, 2.vii.58, and one on a lime trunk in Blackheath Park (29.vi.59). Also fairly common at light, often with *Lygus contaminatus*—all records *AAA* (51); *WW* (4) (39); Lewisham, 9.viii.1896, on lime, *WW* (60) (SL); (Dartmouth Row), 2.viii.1896, on lime, *WW* (60); 1898, *WW* (39); Darenth, *D&S* (4) (36); Shoreham, 1.ix.61, *KCS* (14); and on the boundary at Gravesend, 16.viii.51, *TRES* (13).

SURREY. Wimbledon Common, 3.viii.32, *FJC* (62); Merton Park, 12.vii.49, *FJC* (SL); Cheam (Nonsuch Park), 13.viii. 54 and 8.vii.55; Croydon, *D&S* (37) (36); Shirley, *D&S* (37); Chipstead, 5.vii.59, on hazel, lime, alder buckthorn and oak, *GEW* (EMM **95**: 288); Park Downs, Banstead, 28.vii.55, on dogwood (*Swida sanguinea*), *GEW* (40); Reigate, *ES* (36); Box Hill, 29.viii.37, *ECB* (NM); 21.vii.41, *FJC* (62) (SL); Mickleham, *D&S* (37); 12.viii.40, *FJC* (SL); Ashtead, *FJC* (62); Leatherhead, 6.viii.25, on sycamore, *WEC* (pers. comm.); Bookham Common, 12.viii.56 ♀, *EWG* (24); Esher Common, *D&S* (37); 2.ix.50, *DL* (1/**1950-51**, 79); West End Common, 13.viii.51, *FJC* (62); Black Hills, Esher, *FJC* (62); Arbrook Common, 30.vi.52, *FJC* (62); and beyond the boundary at Burpham, nr. Guildford, 20.vii.43, along the River Wey, *ECB* (NM); Byfleet, 8.vii.50, along towpath of Basingstoke Canal, *DL* (1/**1950-51**: 73); and at Gomshall, 10.ix.51, *HDS* (SL).

BUCKS. On the boundary at Datchet (Ditton Park), 4.vii.55, on lime, *GEW* (40); and beyond at Latimer, 19.viii.16, *EAB* (BM) (C) (NM); Amersham, 16.vii.64, on sycamore, *WJLeQ* (21); and Slough, 26.vii.55, *GEW* (EMM, **92**, 35).

Lygocoris populi Leston Sp. 367 p. 282

First found by Dr W. Le Quesne in June 1951 at Box Hill, Surrey, and described by D. Leston in 1957 (*Entomologist* **90**: 128-137) based on specimens collected at Slough, Bucks. and at Box Hill (see below). The species is believed to have only one generation a year and confined to *Populus alba* and *Populus canescens*.

MIDDX. Edgware (Scratch Wood), 18. & 22.vii.60, on *Populus alba*, *TRES* & *DL* (EMM **97**: 33); 23.vii.60, *DL* (HD).

SURREY. Box Hill, 24.vi.51, on *Populus alba*, *WJLeQ* (21) (SL, 1 example paratype); 24.vi.51, *DL* (54) (SL, 7 examples paratypes);

14.vi.52, *DL* (54) (SL, 3 examples paratypes); Oxshott Heath, n.d., on aspen, *GEW* (40).

BUCKS. On the boundary at Datchet (Ditton Park), 22.vi.55, on *Populus canescens*, *GEW* (40); and beyond at Slough, 21.vi.55, on *Populus canescens*, *GEW* (Type in BM, two paratypes in SL); 4.vii.55, on *Populus alba*, *GEW* (40) (*Entom.* **90**, 128-137).

Lygocoris contaminatus (Fall.) Sp. 368 p. 282
D&S p. 459 (*Lygus sulcifrons*) S p. 250 (*Lygus contaminatus*)
B p. 413 (Sp. 294, *L. contaminatus*)

Frequent, sometimes common. This bug, whose adults are found from the end of June to September, occurs mainly on birch though occasionally found on hazel, willow and alder, where it feeds on the stalks, buds and unripe catkins of the host tree. It overwinters in the egg stage.

MIDDX. Buckingham Palace grounds, 1961, ♀♀ on birch, and also taken at light (1.x.61), *TRES* (52); Hampstead Heath, 18.vii.43, on *Betula*, *CHA* (17); 1949, one specimen only, not common, *DL* (1/**1949-50**: 36-38); 5.viii.60, on birch, *DL* (54) (HD); Harrow Weald Common, 17.ix.60, single ♀ on birch, *DL* (54) (HD); Edgware (Scratch Wood), 23.vii.60, on birch, *DL* (54) (HD); 26.vii.60, *DL* (54); Ruislip LNR, "the most common *Lygocoris* on the Reserve . . . the light green V instar larvae have been beaten from birch in mid-June (18.vi.67 and 19.vi.58, *EWG*) and adults taken from early July (1964, *RAPM*) to the end of the same month (24.vii.56, 20.vii.55 and 29.vii.58, *EWG*)" (49); and Hounslow Heath, 14.vii.53, common and generally distributed on trees, *GEW* (33c) (54).

HERTS. Whetstone, 24.vii.60♀, and 1.viii.60 ♀♀, taken in MV light trap, *PHW* (pers. comm.) (47); Barnet, viii.1885, *EAB* (BM) (37); Rickmansworth, *EAB* (11); Radlett, 10.viii.58, *DL* (HD) (58); Bricket Wood Common, 3.vii.56, *EWG* (24); 14.vii.54, *GGES* (HD); Berkhamsted Common, on *Betula*, *DCT* (12); and just over the boundary at Harpenden, 7.vii. & 30.vii.54, 22.viii.54 and 5.ix.54, *GGES* (HD); and beyond at Royston, 10.vi.19, III instar larva, *EAB* (BM).

ESSEX. Epping Forest (Theydon Bois), vii.22, *EAB* (BM); (Lord's Bushes), *CN* (35a); (Chingford), 15.vii.11, ix.1892, *EAB* (BM); ix.1891 *EAB* in *ECB* coll. (NM); 15.vi.12 (V instar) and 14.vi.15 (V instar), *EAB* (BM); (Monk's Wood), *CN* (35a); (Loughton), 18.vi.10 (adult) and 12.vi.17 (I instar), *EAB* (BM); (Strawberry Hill), *CN* (35a).

KENT. Lewisham, *WW* (4) (39); Blackheath, 15.vii. & 19.vii. 1895, *AJC* (HD); "rather less common than *L. viridis* at MV light (but far from rare—5 at light 31.viii.60) doubtless from birches in nearby gardens; occasionally at golden rod (*Solidago vergaurea*) flowers", *AAA* (51); Shooters Hill, vii.60, on birch, *AAA* (51); Plum-

stead *WW* (39); Dartford, *D&S* (28) (4) (37); Darenth, *D&S* (28) (4) (37); Birchwood, *JAP* (BM); Farningham Wood, 5.vii.65, *KCS* (14); near Chislehurst, 16.ix.05, *Harry Moore* (1/**1905-06:** 52); Bromley *WW* (39); West Wickham Wood, 4.vii.1896 and 22.viii.1896, on birch, *WW* (60) (4) (39); Westerham, 24.vii.60, a few noted, *AAA* (51); on the boundary at Sevenoaks, *EAB* (4) (37); (Knole Park), 9.ix.61, on birch, *AMM* (1/**1961,** 68); (Bitchell Common), 5.ix.60, *KCS* (14).

SURREY. Wimbledon Common, 29.vi.1884 and 7.vii.1897, in ravine on birch, *EAN* (C); 22.vi.48, *FJC* (SL) (62); 25.vi.55, *EWG* (24); Wimbledon (Southfields), 7.vii.1897, on fence in Albert Road, *EAN* (C); Merton Park, *FJC* (62); Cheam (Nonsuch Park), 13.viii.54, *EWG* (24); Purley Downs, *WW* per *FJC* (62); Coulsdon, 18.vi.11, *ECB* (NM); Shirley, 11.vii,1896, on birch, *WW* (60) (SL) (62); *D&S* (28) (37); Reigate, *ES* (37); Mickleham, 6.x.15, *WJA* (SL); *D&S* (28) (37); Box Hill, 17.vii.38, *ECB* (NM); *FJC* (62); Ashtead Common, 20.vii.46, *FJC* (1/**1946-47:** 74) (62); Bookham Common, 16.viii.55, *EWG* (24); Oxshott Heath, 31.vii.15, *WJA* (SL); vi. & vii., *AAA* (51); Esher Common, *JAP* (BM); 4.viii.55, *EWG* (24); 2.ix.50, *DL* (1/**1950-51,** 79); Arbrook Common, 3.vi.48 and 8.vi.52, *FJC* (SL) (62); and Weybridge, *Phillips* (37). On the boundary at Egham, 25.vii.56, on birch, *GEW* (40); and Byfleet, 12.vi.32 and 2.vii.32, *FJC* (SL) (62); and beyond at Chobham, vii.1892, *ES* (HD); Woking, vii,1875, on *Betula*, *ES* (HD) (37) (BM); viii.1888, *ES* (HD); Banks of the Basingstoke Canal between Pirbright Bridge and Frimley Green, 1954-55, *HDS* (50); Ewhurst, *FJC* (62); Leith Hill, 10.vi.16, III instar larva, *EAB* (BM); and Guildford, 12.viii. & 14.viii.41, *ECB* (NM).

BUCKS. Just over the boundary at Slough (ICBFS), 12.vi. & 16.vi.33 and 19.vi. & 22.vi.34, on *Corylus avellana*, *Betula alba*, *Salix* sp., *Rubus* sp., and grass, *WHG* (41); (PILG), 1950-60, abundant on large willows (probably *Salix alba*) though normally on birch, *GEW* (EMM, **96,** 128); and beyond at Burnham Beeches, 22.vi.12, *EAB* (BM); 28.vi.61, on alder, *WJLeQ* (21).

Lygocoris limbatus (Fall.) Foreign species Sp. 368a p. 314
S p. 251 (*Lygus limbatus*)
B p. 415 (Sp. 296, *L. limbatus*)

The claim of this alien species to be on the British list is based on a single capture of several specimens on Wimbledon Common over 90 years ago (see below). No further specimens have been taken either at this or any other British locality since that date. (There was a reported capture of this species by K. G. Blair, 12.v.34, at Chilworth, Surrey (1/**1934-35:** 14) but in the absence of the specimen this record must be regarded as a probable misidentification.—E.W.G.)

SURREY. Wimbledon Common, viii.1880, a few specimens taken on *Salix*, *E & F. S. Saunders* (37) (3) (38).

Lygocoris spinolai (Mey.-Dür) Sp. 369 p. 283
D&S p. 458 (*Lygus spinolae*) S p. 251 (*L. spinolae*)
B p. 417 (Sp. 298, *L. spinolae*)

Occasional. Adults of this species are found from late June until September on bramble (*Rubus fruticosus* agg.), *Urtica dioica*, *Cirsium arvense*, *Filipendula ulmaria* and *Artemisia vulgaris*. It has also been reported on hop. Essex records wanting.

MIDDX. Hampstead Heath (West Heath), 8.x.49 ♀, *DL* (SL); (Ken Wood), 1.x.49, *DL* (SL); Finchley, 31.vii.43, *CHA* (17); and Stanwell, *FPP* (HD, presented 1909).

HERTS. Barnet, viii.1885, *EAB* (BM) (37); Berkhamsted, 31.vii.33, on *Urtica* and *Filipendula*, *DCT* (12); and on the boundary at Harpenden, 1934, 2 ♂♂ taken in light trap in Rothamsted Expt. Stn. grounds, *DCT* (59); 8.viii.37, on *Urtica*, *DCT* (12); and beyond at Wymondley, *EAB* (37).

KENT. Blackheath, 6.vii.61, 20.vii.60, 27.vii.72 and 17.viii.63, almost confined to bramble on which it is not rare, occasionally on thistles, one taken by general sweeping 14.vii.60, *AAA* (51); Eltham, *D&S* (28) (4) (39); Bromley, vii.1887, *ES* (4) (37); and on the boundary at Sevenoaks, *EAB* (4) (37).

SURREY. Surbiton, vii.1892, *ES* (HD); Caterham, *GCC* (37) (3); Reigate, *ES* (3) (37); Headley Lane, *TRB* (3) (37); Claygate, *JAP* (BM); Bookham Common, 16.viii.55, 2 ♀♀ taken on low herbage between the station and S.E. Wood, *EWG* (2/**37:** 57, 1959) (24); Esher Common, *GCC* (3) (37); Horsell, *JAP* (BM); Weybridge, 21.vi.13, V instar larva, *EAB* (BM); on the boundary at Egham, 21.vii.55, *GEW* (40); Byfleet, 12.viii.49, *FJC* (SL) (62); and beyond at Chobham, viii.1874, *ES* (HD) (3) (37); Woking, viii.1882, *ES* (HD) (3) (37); Peaslake, viii.1892, *EAB* (BM); Shalford, *EAB* (3) (37); and Ewhurst, *EAB* (3).

BUCKS. Just over the boundary at Chesham Vale, 5.viii.52, on maple, *WJLeQ* (21); and at Amersham, 23.viii.52, *WJLeQ* (21).

Lygocoris lucorum (Mey.-Dür) Sp. 370 p. 283
D&S p. 458 (*Lygus lucorum*) S p. 251 (*L. lucorum*)
B p. 416 (Sp. 297, *L. lucorum*)

Occasional. Adults occur from July to the beginning of October feeding on the buds, flowers and unripe fruits of such host plants as mugwort (*Artemisia vulgaris*), hemp agrimony (*Eupatorium cannabinum*), nettle (*Urtica dioica*) and tansy (*Tanacetum vulgare*). Eggs laid in the autumn on stems of the host remain *in situ* until they hatch the following spring.

MIDDX. Hampstead Heath, 14.vii.49, *DL* (1/**1949-50:** 36-38) (SL); Finchley, 20.vii.44, *CHA* (17); Southgate, 16.viii.1883, in cemetery, *EAN* (C); Edgware (Scratch Wood), 18.vii.60, *DL* (HD) (54); Ruislip, 7.viii.44, *CHA* (17); Ruislip Local Nature Reserve, 9.viii.64, in fair numbers in *Artemisia vulgaris*, *RAPM* (49); 24.vii.56, 29.vii.55, and 1.ix.55, in various damp situations, *EWG* (49); and Harefield, 21.vi.52, *WJLeQ* (21).

HERTS. Barnet, viii.1881, *EAB* (BM) (37); Elstree, 16.vii.44, *CHA* (17); Bushey, *JAP* (BM); Radlett, 10.viii.58, *DL* (HD) (54); Berkhamsted, 31.vii.33, on *Urtica*, *DCT* (12); and just over the boundary at Harpenden, 6.viii.33, a single ♂ taken in light trap in Rothamsted Expt. Station grounds, *DCT* (12) (59); 12.vii.55, 5.viii.54 and 5.ix.54, *GGES* (HD).

ESSEX. Epping Forest (Chingford), n.d., *EAB* (BM).

KENT. Blackheath, 20.vii.60 and 22.viii.65 (on nettle), 13.ix.64 ♀ (on mugwort), and 5.viii.61 & 22.viii.64, singly by general sweeping, *AAA* (51); Abbey Wood marshes (Erith Marshes), 24.vii.54 and 31.viii.55, by sweeping, *EWG* (24); Upper Belvedere, 5.vii.59, *RGR* (WBM); Darenth, *FPP* (HD, presented 1909); Fawkham, 22.vii.56, *GGES* (HD); Bromley, 8.viii.66, *PJC* (63); and on the boundary at Gravesend, 17.viii.54 and 20.viii.55, *GGES* (HD).

SURREY. Banks of the River Thames east of Hammersmith Bridge, 18.vii.1883, on *Artemisia vulgaris*, *EAN* (C); Wimbledon Common, 25.vi.1882, *EAN* (C); Surbiton, vii.1892, *ES* (HD); Reigate, *ES* (3) (37); Box Hill, 29.viii.37, *ECB* (NM); Bookham Common, 29.vii.50, *DL* (1/**1950-51:** 76) (52); vii. & viii., *DL* (34); 16.viii.53 ♂ ♂, 13.ix.56, and 4.x.53 ♀, *EWG* (24); 11.viii.69, *PSB* (16); and on the boundary at Byfleet, 24.vi.49, *FJC* (SL); and beyond at Woking, viii.1888 and viii.1891, *ES* (HD); and Albury, 21.viii.41, *ECB* (NM).

BUCKS. On the boundary at Datchet (Ditton Park), vii.55, *GEW* (40); and just over the boundary at Latimer, 19.viii.16, *EAB* (BM); 20.vii.52 (on birch) and 25.viii.51, *WJLeQ* (21); Amersham, 6.vii.52 and 22.viii.53, *WJLeQ* (21); Chenies, 20.vii.52, *WJLeQ* (21); and Slough (ICBFS), 22.v. & 24.v.35 and 9.vi.33, on *Ribes nigrum* and *Salix* sp., *WHG* (41).

(End of Part VIII)

Conserving and Recording Birds in London

by Evelyn P. Brown

(*Presidential address delivered on 11 December 1972*)

Summary

The requirements needed in London parks for the conservation of birds are outlined, including retention of old trees, maintenance of good undergrowth, creation of enclosures free from disturbance, planting of suitable trees and shrubs, and provision of water.

Reference is made to the reservoirs of the Metropolitan Water Board and co-operation with that Board for the preservation of bird life.

The importance of recording in relation to the conservation of birds is emphasised and the methods used in Holland Park are outlined. Analyses of monthly count figures made in Holland Park for the breeding season months of April, May and June and the winter months of December, January and February from 1963 to 1972 are given, these showing, in particular, an increase in the numbers of blackbirds and robins, and a decrease in the numbers of woodpigeons and starlings. It is noted that 1972 has been an encouraging year in Holland Park, and some information about breeding success is given.

Introduction

When I was considering what should be the subject of this address it occurred to me that an account of what is required in the London parks to encourage birds, and what in fact the parks official observers do in this respect might be appropriate, coupled with some comments on methods of recording birds in these areas.

Conservation Measures in London Parks

Conservation of birds in London parks really means the preservation, and even the creation, of areas that are particularly suitable for birds and from which they can spread. The principal requirements are, of course, food and water, shelter and nest sites and freedom from too much disturbance by people, though on the whole, as I have shown elsewhere, birds are remarkably tolerant of people if people are tolerant of them.

One of the first problems encountered is too much tidiness and this is fraught with dangers for no one wants to see human litter left about. No one wants to see paper, bottles, beer cans, and such debris as cigarette ends and matches can even be a fire hazard. Nor does anyone want to see the lovely gardens in so many of our parks untidy. I would be the last person to be against the preservation of the Dutch Garden in Kensington Gardens, or the originally Portuguese but now Dutch Garden in Holland Park, or the Knot Garden and other gardens at Hampton Court or even the cherry tree avenue and rose garden at Ravenscourt Park, Hammersmith, but these specialised flower gardens are not big and the birds resident in them

are likely to be blackbirds, song thrushes, dunnocks, perhaps spotted flycatchers, and they will be visited regularly by feral pigeons and house sparrows. It is in the surrounding parts of the parks that the areas suitable for birds need to be preserved and created, and here by untidiness is meant the retention of old trees, including dead and dying ones, the creation and preservation of good undergrowth, the leaving of fallen trees and branches and stumps, all of which provide food and shelter and nest sites.

With this end in view it is also obviously necessary to enclose certain areas, with perhaps paths through them so that people can enjoy them. This, of course, also preserves botanical and other natural history interests, since trampling can be so damaging to plants and undergrowth. One careful person going through an enclosure daily will do no harm, but a number going through once may do irreparable damage. Where enclosures exist every effort must be made to keep them inviolate. Woodland areas that are of particular interest in this connection are Ken Wood, Hampstead, and the woodland areas of Holland Park, both G.L.C. parks. The exclusion of the public from these woods permits a good undergrowth such as bramble, so valuable for blackcap nesting, and yet the public can enjoy these woodlands by walking along the paths provided. Management of these woodlands is difficult since some regeneration and replanting is obviously necessary and watch has to be kept for diseases such as Dutch elm, but birds like a variety of trees and shrubs and in variety lies a natural protection from disease and also opportunity. Birds also like the edges of woods and open glades, so here again is opportunity. Planting of trees and shrubs that provide food and shelter are to be encouraged, particularly native species, for instance, hawthorn, oak, birch, hazel, beech, wild roses, bramble, shrubs with berries and thorns, and some conifers to attract goldcrests and coal tits. Rhododendrons are to be avoided; beloved of park keepers because they are showy, they are nevertheless of little value except in small numbers for nesting and roosting and they tend to spread quickly and oust much more attractive and valuable plants.

Water is essential and here the London parks are fortunate. Most of them have considerable lakes which attract water-birds. Holland Park lacks these but has several ponds and smaller pieces of water. Indeed the water at the Commonwealth Institute—adjacent to Holland Park—attracted a grey wagtail in the autumn of 1972 and is much used by mallard, many of whom no doubt breed in the Park itself. It is, however, an asset if the edge of water can be left natural so that birds can easily get to the water, bathe in it and feed along the edge. If there is an overhanging edge to water, as in the ponds at the north end of the Serpentine, then it is necessary for a kind of ladder to be provided so that ducklings can get out of the water as necessary and this is usually done. The sloping concrete edges of reservoirs can have their uses since I have seen coot fishing up mussels from

these reservoirs, carrying them to the edge and using this as an anvil on which to break the shells. However, basically the natural edge to a piece of water with undergrowth growing down to it is to be preferred, as in the pond in the woods of Holland Park.

In Hyde Park and Kensington Gardens there are several enclosures; two are specifically bird sanctuaries and one a recently created wild flower sanctuary. The Long Water Sanctuary has a good growth of bramble and attracted a breeding pair of willow warblers in 1969, while the Hudson Memorial Sanctuary has attracted such birds as a wood warbler and even a firecrest. The enclosure behind the Peter Pan statue has attracted breeding blackcaps. It is, of course, essential that these enclosures should be managed and protected in the best interests of the birds and the present two official observers for Kensington Gardens and Hyde Park are to be congratulated on the success of their efforts. St James's Park with its collection of duck is well protected though it lacks the undergrowth which attracts smaller passerines. Regent's Park also has its sanctuaries, one of which is particularly suitable for blackcaps, and it has water. It is on an island in this water that a small heronry has recently established itself.

Going farther out of London a visit to Richmond Park shows many features of interest in the conservation of birds. Pen Ponds with its area of undisturbed reed is most attractive to birds and the comparatively recent opening up and landscaping of the Isabella Plantation shows how features which contribute to the conservation of birds can be incorporated in and indeed add to the attraction of such an area for people. Indeed anyone wishing to see small species at close range is strongly recommended to visit Holland Park, Kenwood and Richmond Park where the birds are so tame. In the Isabella Plantation dead trees have been left, there is water, a tree stump has been made into a bird table and the variety of trees, including a small birch plantation, attracts warblers. Also the large open hinterland provides opportunities for birds not normally seen at bird tables to visit the one at the Isabella Plantation. For instance, I have seen a yellowhammer there. Richmond Park has also many fine old trees which attract owls, kestrels, woodpeckers and nuthatches. The open areas of rough grass, including ant-hills, and the retention of these old trees provide a habitat both in Richmond and Bushey Parks which is suitable for the green woodpecker.

In Bushey Park parts of the Waterhouse Plantation have been left untidied up in a way which attracts warblers and here too there is water. More recently a plantation, long closed to the public, has been landscaped and opened up, and an island has been left in its natural condition. There is also a bird sanctuary in Osterley Park, and Greenwich Park has its sanctuaries too.

Opening up an area can, of course, have an adverse effect on its bird life, though if it is well done this may often only be of a temporary

nature. The bird life of Holland Park may well have declined when the L.C.C., as it then was, opened it up, though there is insufficient information before its opening to confirm this. The bird life increased from the early 1950s to 1960, and although it seems now to have levelled off, Holland Park is still well populated. The case of a park which has lost its attraction for birds, understandably enough, is Ravenscourt Park in Hammersmith. This park is the only park in the middle of a built-up area and quite rightly the L.C.C., now the G.L.C., has regarded it as a public open space, with extensive playing fields and playgrounds, but its bird life has suffered. W. H. Hudson in his book *Birds in London* published in 1898, calls it the "most beautiful park in London." He writes that he lived beside it when, "the old manor house inside the park was seldom occupied; no human figure was visible in the grounds, there were no paths and all things grew untended. The grass was everywhere long, and in spring lit with colour of myriads of wild flowers; exquisitely beautiful in its dewy and flowery desolation, it was like a home of immemorial peace, the one remnant of unadulterated nature in the metropolis. The alterations that had to be made in this park when the County Council took it over produced in me an unpleasant shock; and the birds were also seriously affected by the change. When the gates were thrown open, in 1888, and a noisy torrent of humanity poured in and spread itself over their sweet sanctuary, they fled in alarm, and for a time the park was almost birdless. The Carrion Crows, strange to say, stuck to their nesting tree and by-and-by some of the deserters began to return, to be followed by others, and now there is as much bird life as in the old days. It is probable, however, that some of the summer visitors have ceased to breed. At present we have the Crow, Woodpigeon, Missel-thrush, Chaffinch, Wren, Hedge-sparrow and in the summer the Pied Wagtail and Spotted Flycatcher and Willow-Wren".

Now this park has no suitable habitat for the willow warbler, as it is now called, except possibly for a passage bird. There is a small island in a small lake, if it can be called that, where there are a few waterfowl and where a migrant might find a resting place. Certainly mistle thrush, song thrush, blackbird, dunnock may be found there now and also possibly robin and greenfinch and even perhaps a wren but the greater part of the park is open grass with the odd big tree and here and there some attractive flower-beds. It is pleasant, but I always feel this is what has to be guarded against in such parks as Holland Park, where in time as the trees grow old—and many of them already are old—public pressure might cause encroachment on the enclosures and the birds like the nuthatches, woodpeckers, coal tits, long-tailed tits, goldcrests, and so on disappear for ever.

Prevention of disturbance has also to be watched. Quite apart from the invasion of enclosures by the public there is the danger of tree pruning in the breeding season. Scything of grassy areas where ground nesting birds breed has also to be prevented at this time.

Nest boxes, which should be beneficial, can be a trap since they are so often torn down and hole-nesting birds are probably safer in natural holes if the older trees can be left. Squirrels need controlling and so do cats and dogs.

Perhaps I should mention that the conservation of birds in the Royal Parks is in the hands of the Committee on Bird Sanctuaries in the Royal Parks (England and Wales) and that a representative for the G.L.C. Parks is co-opted to that Committee. The official bird observers are appointed by this Committee in the case of the Royal Parks and by the G.L.C. for the G.L.C. parks.

Metropolitan Water Board Reservoirs

Before I turn to recording methods and problems I would like to refer to the other big source of bird life in London, namely the Metropolitan Water Board's reservoirs. These are, of course, wholly controlled by the Board which, on application, will issue permits to bird-watchers to visit certain reservoirs. The Board are, however, aware of the value of the bird life, and they do consult natural history interests about use of the reservoirs for recreation which might affect the bird life. It is fortunate that there is this co-operation. There are not, however, any official bird observers as such although the monthly winter duck counts organised through the Wildfowl Trust do provide regular information.

Recording Bird Life in London

Conservation cannot easily take place without the interest created by and information obtained by recording the bird life of London. Recording of its local natural history must always be the primary object of any good natural history society and it has an interest and fascination which can complement ventures farther afield. Recording can range from noting any birds one sees in the London Area, or in one particular London area, to co-operating in any of the Society's research projects and to the more sophisticated methods of mapping and census-taking.

Recording in Holland Park

In Holland Park I have followed the Bookham Common technique of a monthly mapped count based on a fixed route and in addition have paid frequent shorter visits, often with a special object in view, such as noting the arrival of migrants or the obtaining of definite breeding evidence. The latter can take a lot of time and in an area like a public park needs to be approached with circumspection in order not to give away the whereabouts of the nest or young to predators, including human beings. Dawn recording is difficult in a central London park for reasons not connected with the birds, but on the few occasions when I have heard the Holland Park

dawn chorus it has been so powerful that distinguishing individual songsters for mapping purposes was impossible. I have always sent my records to the Inner London Recorder for the L.N.H.S. as well as to the G.L.C. Needless to say I have also sent in any other London Area recordings to the appropriate recorder. The Parks Observers can follow what technique they find most suitable, though, of course, they send in full reports as required by the Committee, but the London reservoirs are not only recorded by information sent in to the L.N.H.S. by bird-watchers but through the duck counts already mentioned.

You may like to have some more information about the Holland Park birds resulting from a further analysis of my monthly count figures. These exclude feral pigeons and house sparrows which are so numerous that they tended to render my maps almost unintelligible! In any case the feral pigeon appears to be no longer a breeding species although it comes into the Park to feed in large numbers and is seen more frequently in the woods than formerly. It can also be seen sitting near holes in old trees but I have not so far obtained any evidence that it is breeding in them. There are, however, several colonies of breeding house sparrows, notably under the arches in the garden and in several of the palm trees and ivy-covered trees. There is thought to have been a slight falling off in the numbers of house sparrows in the London Area recently, but it retains its adaptability. They soon learned to take nuts from an R.S.P.B. nut basket hung on a balcony outside a window overlooking a Kensington communal garden, and tended to drive off the great, blue and coal tits for which I had intended the nuts. In the country where I am now living only one house sparrow has acquired this habit, although in this case the nuts were in a net, an even greater compliment possibly to the adaptability of the sparrow.

Analysis of Breeding Season Count Figures

The analysis of the count figures to which I am referring relates to the years 1963-1972 and covers the breeding season (Table 1) and the winter months of December, January and February (Table 2). It is based on the number of contacts made during a count and not on territories. There is some evidence of a slight falling off in the number of birds recorded in the breeding season during the last few years, since 1969, 1971 and 1972 show the lowest figures but 1970 on the other hand showed a considerable increase, and 1965 showed a decrease as compared with other years from 1963 to 1968 (see Table 1). An interesting point is that while the woodpigeon topped the list as the most abundant bird from 1963 to 1966 with the blackbird second (except for 1963 when it was third), its place was taken by the blackbird from 1967 onward. The woodpigeon dropped to second place until this year when it dropped to fourth place, the robin and dunnock tying for second place. The rise of the robin, which was

TABLE 1. Analysis of count figures 1963-1972. Breeding season: April, May and June.

1963 Total contacts 677	1964 Total contacts 657	1965 Total contacts 565	1966 Total contacts 660
1. Woodpigeon	1. Woodpigeon	1. Woodpigeon	1. Woodpigeon
2. Starling	2. Blackbird	2. Blackbird	2. Blackbird
3. Blackbird	3. Starling / Dunnock	3. Dunnock	3. Starling
4. Robin		4. Starling	4. Dunnock
5. Dunnock	5. Robin	5. Robin	5. Robin
6. Great tit	6. Great tit	6. Blue tit	6. Song thrush
7. Mallard	7. Mallard / Blue tit	7. Great tit	7. Great tit
8. Greenfinch		8. Song thrush	8. Mallard
9. Song thrush	9. Song thrush	9. Wren	9. Blue tit
10. Blue tit	10. Wren	10. Mallard	10. Wren
11. Chaffinch	11. Greenfinch	11. Jay	11. Jay / Greenfinch / Chaffinch
12. Wren	12. Chaffinch / Jay	12. Chaffinch	
13. Nuthatch		13. Greenfinch	
14. Carrion crow	14. Nuthatch	14. Blackcap	14. Blackcap
15. Jay	15. Tawny owl	15. Carrion crow	15. Willow warbler

1967 Total contacts 609	1968 Total contacts 693	1969 Total contacts 537	1970 Total contacts 606
1. Blackbird	1. Blackbird	1. Blackbird	1. Blackbird
2. Woodpigeon	2. Woodpigeon	2. Woodpigeon	2. Woodpigeon
3. Dunnock	3. Starling	3. Robin	3. Dunnock
4. Starling	4. Dunnock	4. Dunnock	4. Starling
5. Robin	5. Robin	5. Starling / Song thrush	5. Robin
6. Blue tit	6. Mallard		6. Song thrush
7. Great tit / Mallard	7. Blue tit	7. Great tit	7. Blue tit
9. Song thrush	8. Song thrush	8. Greenfinch	8. Mallard
10. Wren / Willow warbler	9. Great tit	9. Blue tit	9. Great tit
	10. Greenfinch	10. Wren	10. Wren
12. Mistle thrush	11. Wren	11. Mallard	11. Greenfinch
13. Greenfinch	12. Blackcap	12. Carrion crow	12. Jay
14. Jay / Bullfinch	13. Jay	13. Coal tit / Chaffinch	13. Coal tit
	14. Chaffinch		14. Bullfinch
	15. Carrion crow	15. Jay	15. Blackcap

1971 Total contacts 546	1972 Total contacts 479
1. Blackbird	1. Blackbird
2. Woodpigeon	2. Robin / Dunnock
3. Robin	4. Woodpigeon
4. Blue tit	5. Song thrush
5. Song thrush / Dunnock	6. Blue tit
7. Great tit	7. Mallard
8. Mallard	8. Great tit / Wren
9. Starling	10. Starling
10. Wren	11. Coal tit / Long-tailed tit / Greenfinch
11. Greenfinch	
12. Coal tit / Nuthatch	14. Blackcap
14. Chaffinch	15. Chaffinch
15. Spotted flycatcher	

around fourth or fifth place till 1971 when it came third and in 1972 second, is both interesting and satisfying, since being basically a woodland bird is seems to me to be a tribute to the maintenance of the woodland character of the Park. There are, of course, other factors which may be militating against the woodpigeon, such as the floodlighting of the fringe of the woodland at night and the presence of grey squirrels, but it does also point to the robin's adaptability where disturbance is concerned. The starling is the other bird which has shown a marked change. In the first half dozen places from 1963

to 1970 and often as high as third, in 1971 and 1972 it dropped to ninth. I should, however, mention that although these are breeding season figures they will also include birds coming into the Park to feed, and blackbirds, woodpigeons and starlings are the three species whose count figures are likely to be most swollen by this factor. The dunnock is also always in the first half-dozen. The song thrush is showing a welcome tendency to increase, though the change is not so marked as with the robin. Great tits, blue tits and mallard—I have excluded the Commonwealth Institute figures for the mallard—tend to be about the half-dozen mark, with on the whole not the difference between great and blue tits that might be expected, though 1971 and 1972 show an increase of blue tits over great tits. The other regular breeding birds, jay, crow, coal tit, wren and chaffinch show the position that would be expected in relation to the number of known breeding pairs, i.e. one or two except in the case of the wren which, with four or five pairs, is usually about tenth. It is clear from the figures that the chaffinch has decreased slightly since 1966.

It is interesting to note the differences between the bird population in Holland Park, an Inner London Park, with rural areas of semi-natural woodland, and the figures given by Simms (1971) and Yapp (1962) for the relative abundance of bird species in pedunculate and sessile oak and beech woods are useful in this respect. In the latter cases the chaffinch tops the poll with the woodpigeon coming fourth in beech woods and sixth and eleventh in oak woods. The blackbird, however, comes second in beech woods although it is fourth and twelfth in oak woods. The robin's status does not vary much from its Holland Park position but the wren is much lower in Holland Park and the willow warbler, driven out of Holland Park in my opinion by too much disturbance, comes into the first half-dozen in both the Simms and Yapp figures. The starling occupies a low position in both beech and oak woods. The dunnock comes much lower in the scale. The great tit comes high in beech woods, above the blue tit, and as there are beeches in Holland Park this may have some bearing on the great tit's precedence over the blue tit in some of the years recorded.

Analysis of Winter Count Figures

In a majority of years the counts for the winter months of December, January and February show a higher total figure of contacts than those for the breeding season (see Table 2). Once again the woodpigeon tops the poll until 1967-1968, with the blackbird second, but in 1968/69 the blackbird took over and the woodpigeon took second place. The big woodpigeon roosts in Holland Park have slowly diminished until now they are negligible, probably as I mentioned before, partly due to the flood-lighting of the gardens. The starlings, however, usually occupy third place in the winter. The blue tits, robins, great tits and dunnock vary over the next few places

TABLE 2. Analysis of count figures, 1963-1972. Winter: December, January and February.

1963/64 Total contacts 512	1964/65 Total contacts 478	1965/66 Total contacts 625	1966/67 Total contacts 620
1. Woodpigeon	1. Woodpigeon	1. Woodpigeon	1. Woodpigeon
2. Blackbird	2. Blackbird	2. Blackbird	2. Blackbird
3. Dunnock	3. Great tit	3. Starling	3. Robin
4. Starling	4. Starling	4. Dunnock	4. Dunnock
5. Blue tit	5. Robin / Blue tit	5. Blue tit	5. Blue tit
6. Robin	7. Dunnock	6. Robin	6. Starling
7. Great tit	8. Song thrush	7. Great tit	7. Great tit
8. Greenfinch	9. Chaffinch	8. Song thrush	8. Mallard
9. Song thrush	10. Greenfinch / Jay	9. Mallard	9. Song thrush
10. Jay	12. Nuthatch	10. Greenfinch	10. Greenfinch
11. Carrion crow / Chaffinch	13. Coal tit	11. Jay	11. Black-headed gull
13. Mallard	14. Carrion crow / Mallard	12. Chaffinch	12. Carrion crow / Redwing
14. Nuthatch		13. Mistle thrush	14. Jay
15. Wren / Bullfinch		14. Carrion crow / Coal tit	15. Coal tit

1967/68 Total contacts 682	1968/69 Total contacts 766	1969/70 Total contacts 754	1970/71 Total contacts 780
1. Woodpigeon	1. Blackbird	1. Blackbird	1. Blackbird
2. Blackbird	2. Woodpigeon	2. Woodpigeon	2. Woodpigeon
3. Starling	3. Starling / Blue tit	3. Starling	3. Starling
4. Blue tit	5. Robin	4. Blue tit	4. Blue tit
5. Robin	6. Dunnock / Black-headed gull	5. Robin	5. Redwing
6. Dunnock	8. Great tit	6. Dunnock	6. Dunnock
7. Great tit	9. Song thrush	7. Great tit	7. Robin
8. Redwing	10. Greenfinch	8. Black-headed gull	8. Greenfinch
9. Song thrush	11. Redwing	9. Redwing	9. Great tit
10. Carrion crow	12. Mallard	10. Song thrush	10. Song thrush
11. Greenfinch	13. Jay	11. Greenfinch	11. Mallard
12. Black-headed gull	14. Carrion crow / Coal tit	12. Jay / Chaffinch	12. Jay
13. Jay		14. Mallard	13. Coal tit
14. Chaffinch		15. Coal tit	14. Black-headed gull
15. Coal tit			15. Chaffinch

1971/72 Total contacts 563
1. Blackbird
2. Woodpigeon
3. Starling
4. Blue tit
5. Great tit / Dunnock
7. Song thrush
8. Robin
9. Jay / Long-tailed tit
11. Carrion crow / Greenfinch
13. Mistle thrush
14. Mallard
15. Coal tit

with, however, a sizeable increase in the number of blue tits in 1968/69. The song thrush remains about ninth or tenth with the chaffinch and the wren near the bottom. The latter is more difficult to record in the winter since it does not sing much, and is small and difficult to see. The winter lists are occasionally altered by the presence of sizeable numbers of black-headed gulls and redwings on the playing-field although the mallard are fewer. I should add that the wood-pigeons almost disappear in October, presumably searching for acorns elsewhere, while the blackbirds tend to have unusually large counts in October/November. Greenfinches can appear as early as eighth in

the breeding and winter counts but are more likely to be about tenth or eleventh.

These counts do not include the peak period for jays, namely in March when as Bewick describes "they sometimes assemble in great numbers early in the spring, and seem to hold a conference, probably, for the purpose of fixing upon the districts they are to occupy; to hear them is truly curious; while some gabble, shout or whistle, others with a raucous voice, seem to command attention: the noise made on these occasions may be aptly compared to that of a distant meeting of disorderly drunken persons". The maximum number of jays recorded in Holland Park on these occasions recently has been eight. I have, however, heard a jay in Holland Park crooning to its mate in so soft a voice that I could not believe it could have come from this bird.

It is disappointing to note from these counts that the number of contacts with both tawny owl and great spotted woodpecker has deteriorated over the years, although both species are still being recorded from time to time, and it is also disappointing that a pair of blackcaps failed to nest successfully this year.

Conclusions and Comments on 1972 Records

This further analysis of figures confirms the conclusions about Holland Park which I gave you last year. 1972 has, however, been on the whole an encouraging year. Both long-tailed tits and goldcrests again bred, the latter being double-brooded. This latter is of particular interest since Simms (1971) lists the goldcrest as a woodland bird which has been unable to make the transition to man's environment. Let us hope that Holland Park has managed to meet the requirements of this species and that it will continue there for many years. A pair of nuthatches is still in the Park and a juvenile kestrel was very much in evidence throughout July. Two pairs of spotted flycatchers and a pair of bullfinches bred successfully, and pied flycatchers as well as the usual chiffchaffs and willow warblers were seen on passage. Furthermore a grey wagtail on the Commonwealth Institute water in September and a wood warbler singing on a May morning added to the bird-watching delights of Holland Park in 1972.

The use of the *Reports by the Committee on Bird Sanctuaries in the Royal Parks* is acknowledged.

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The Past and Present Bird Life of the Brent Reservoir and its Vicinity - an Amendment

by P. J. GRANT *

The London Naturalist **50:** 8-62 contained a paper on the past and present bird life of the Brent Reservoir and its vicinity. Due to an oversight it included references to several records of rare birds for the London Area, the details for which either had not been submitted to the Ornithology Section's records committee or had not been accepted by that committee. The following list draws attention to these records in the form of amendments to the systematic list of species (pp. 39-60): the amendments should also be borne in mind when referring to the remainder of the text. Doubtless this list contains some perfectly good observations, and the records committee would be pleased to consider any evidence that is forthcoming, but, for the present, the committee cannot regard them as official London Area records.

RED-THROATED DIVER: Amend to read "Despite extensive watching only one bird has been seen since 1950." (This was on 7 November 1954.)

BLACK-THROATED DIVER: Delete the record for 21 January 1962.

WHOOPER SWAN: Delete reference to ten during the early part of 1955.

MARSH HARRIER: Delete the record for 26 April 1964.

HOBBY: Amend to read "Six records since 1953 . . . ." (These were in 1953, 1958, 1959(2), 1960 and 1964: details in the appropriate *London Bird Reports.*)

MERLIN: Amend to read ". . . one male was seen on 23 February." (Printing error.)

PEREGRINE FALCON: Amend to read "Since then there have been three records." and delete from ". . . including one on 25 July 1961." to the end. (The four officially accepted records are: 20 January 1951, 20 March 1954 (2), 7 January 1958, and 29 January 1961, as recorded in the appropriate *London Bird Reports.*)

SPOTTED CRAKE: Delete the records for 4 September 1957 and 20 September 1958.

BLACK-TAILED GODWIT: Delete the record of eight on 12 August 1964 and amend to read "Only five records, two of which have been in the present century."

GREAT SNIPE: Delete reference to the records of 22 July and 18 August 1959.

STONE CURLEW: Delete the record for 15 April 1969.

*On behalf of the Ornithology Section's records committee.

GLAUCOUS GULL: Amend to read "Since then there have been three individuals recorded." (These were in 1955, 1957 and 1958: details in the appropriate *London Bird Reports*.) Amend to read ". . . there have been three records of glaucous/Iceland gulls . . ." (These were in 1960, 1962 and 1963: details in the appropriate *London Bird Reports*.)

KITTIWAKE: Amend to read "Since 1940 it has been recorded on sixteen occasions from August to May." (These were in 1944 (3), 1949 and two records in each of the following years 1954, 1957, 1958, 1959, 1960 and 1961: details in the appropriate *London Bird Reports*.)

SANDWICH TERN: Amend to read "Since then there have been nine records involving twenty-seven individuals." (These were in 1951 1 record: 1 bird, 1960 3: 5, 1963 1: 1, 1964 1: 1, 1967 2: 12, 1968 1: 7. Further details of these records appear in the appropriate *London Bird Reports*.)

RICHARD'S PIPIT: Delete the record for 19 October 1963.

LAPLAND BUNTING: Delete the records for 13 December 1959 and 19 December 1961.

TWITE: Delete the records for 31 January 1954, 30 March 1960, 28 April 1961 and 30 December 1962.

CROSSBILL: Delete the record for March 1955.

HOODED CROW: Delete "In January 1960 up to three were present." (Only one is officially recorded for that winter.)

Survey of Bookham Common:

THIRTY-FIRST YEAR

Progress Report for 1972

General (G. Beven)

On 25 February Cyril Philip Castell died; he had been severely disabled by a stroke in 1967. This was a grievous loss to the survey. For 26 years his careful organisation, expert knowledge, and above all his quiet but continued enthusiasm inspired the survey and kept it very much alive. Even when incapacitated by illness he maintained his interest, discussing many problems with members of the survey team and even writing a short paper on the vegetation, overcoming enormous difficulties which made the business of living from day to day take up much of his time.

He rapidly became the accepted leader of the survey, later officially recognised as director. He had many sound ideas about lines of enquiry and conservation work. He drew the base map which is still in use, wrote wholly or partly twelve papers, and made important contributions to each of 25 annual progress reports. He played a prominent role in persuading others to help the survey in many different ways and to publish their work. This amateur survey has now continued for 31 years and is perhaps unique in this country. The Society owes Cyril Castell much for his persistent effort; the Research Hut has been named after him in recognition of his outstanding services. A more detailed obituary notice appears on page 121,

We are sorry to learn that Dr John L. Harrison, lately Raffles Professor of Zoology at the University of Singapore, died on 19 July 1972. On the all too rare occasions when he was in this country he was an active member of the survey. In the mid-nineteen forties he made studies of the water snails, and ten years later he initiated the work with small mammal traps which among other things revealed the presence of the harvest mouse on the Common.

Owing to ill-health and his impending retirement David Macer-Wright has felt he must resign as Honorary Commons' Manager for the National Trust. He has been closely associated with Bookham Common for many years and has done much for nature conservation there, working always in close co-operation with the survey team of our Society. We are indeed grateful to him.

Thanks are due to members of the survey team who toiled at cleaning and repainting the Research Hut on two days in September.

A start was made in early December on the first part of the National Trust's plan for the clearing of the main chain of ponds on the Common, by draining the Isle of Wight Pond. Over many years these ponds have become heavily silted up. When the dam was

breached many fish including carp *Cyprinus carpio* L. and rudd *Scardinius erythrophthalmus* (L.) were washed down into Bookham Stream. Some were caught and transferred to other ponds, including Lower Eastern Pond, but some were stranded on the mud and died. Several carp were 8-9 inches (20-23 cm) long. The willow scrub round the edge of the pond is being cut and pulled up except for a patch near the centre which is to form the basis for an island.

The late summer and autumn between July and October was very dry in the London Area, the driest since 1947. Over the longer period April to December, only 274 mm of rain fell, 57 per cent. of 477 mm, which is the average at Kew over 35 years (1916-1950). The water table on Bookham Common seemed very low by the end of the year.

Vegetation (Ella M. Hillman)

1. The dry summer, the clearing of ditches with improvement to drainage, the cutting of wide swathes in overgrown grassland areas, have all combined to make the Common more accessible to the general public, and rightly so, as it is National Trust property. Human visitors in some areas are twenty times as numerous as they were ten years ago. Fortunately the Common has so far not suffered greatly from these pressures, but the greater accessibility of streamsides and woods can result in an increase of picking of plants to the detriment of the vegetation. Perhaps the stranger who was seen carrying away armfuls of teasels (*Dipsacus fullonum*) may be responsible for the fact that this plant, described as "locally frequent" by the streams in 1953, is now reduced to one or two stems, for when picked it may not have ripened seed though appearing withered. In the same way, ill-timed cutting may deprive an area of its annuals, but by late or partial reaping, it is hoped to preserve *Vicia hirsuta* and *V. tetrasperma* and other annuals in the grassy areas. It is, of course, an offence to pick plants on National Trust property.

2. In 1969, as described in the progress report for that year, the cutting of *Deschampsia cespitosa* on Central Plain resulted in a conspicuous and plentiful flowering of *Angelica sylvestris*. This boost to the plant may be the reason for the "population explosion" of this species on the plains (particularly in the southern part) in 1972. A similar increase, however, was observed in other areas, including Lemsford Springs Nature Reserve in Hertfordshire, and the explanation suggested by the Warden there, Mr T. Gladwin, may be correct, namely, that the changes in climate, with cold springs, cool summers and warm autumns, are beneficial to the late flowering plants. *Heracleum sphondylium* was also abundant at Bookham. It may be that at Bookham both factors are involved. Two giant specimens of *Angelica sylvestris* were found, 242 cm and 230 cm (eight feet) in height. The maximum height given by Clapham, Tutin & Warburg (1962: 671) for this species is "200 cm or more" which suggests that

our plants are outside the normal range. They were growing very close to trees beside a path in a scrub area, and reaching up for light may account for their height, but such plants often have weak attenuated stems, whereas these *Angelica* specimens had very stout stems 3·5 cm in diameter at the base.

3. The *Ruscus aculeatus* survey has continued and a report appears in this issue.

4. The only other organised plant recording is of the stream-side vegetation on the eastern side of Central Ditch. This was cleared of impenetrable scrub in 1971 and the former stream-side path recreated, which has since been reaped of a luxuriant growth of herbage including *Urtica dioica*. Miss J. Stoddart is now listing the plants with a view to studying the succession and the effects of repeated cuttings along the stream-side.

5. On Eastern Plain the cutting of bracken *Pteridium aquilinum* late in 1971 because of fire danger involved also the cutting of the flowering stems of *Molinia caerula*. Nevertheless this grass has made a good show in the autumn of 1972. Earlier in the summer *Agrostis* spp. and *Festuca* spp. were plentiful, the aspect of the Plain being that of grassland with scattered birches and frequent young bracken. Other members of the damp heathland community have not yet been successful in spreading from the tiny pockets remaining after the bracken overran this Plain. *Cirsium dissectum* is still found in the small *Molinietum* which was saved, but its flowers were not as plentiful this year. *Epipactis purpurata* and *Listera ovata* were both found on the Plain in areas where bracken is being controlled. Clearing of saplings of *Betula pendula* and *Populus tremula* has continued as they were nearing the *Molinietum*.

6. Other records of interest are *Epipactis helleborine* in South East Wood, a photograph of which revealed seven perianth segments on one flower, *Dactylorchis fuchsii* on Central Plain, and a tree of *Rhamnus catharticus* on Central Plain revealed by the opening up of paths through the scrub.

7. It is pleasing to report that the spread of *Impatiens glandulifera* along Isle of Wight ditch has been checked (perhaps by the picking of this annual plant) and it is now reduced to one small clump. Thus at present it does not threaten the other stream-side plants. *Conium maculatum* was plentiful, and *Hesperis matronalis* persists; both were flowering in October.

8. A dead oak bough was found stained turquoise by the fungus *Chlorociboria aeruginascens* in December, by Dr G. Beven in Eastern Wood (645 and 653). Although this is a common fungus, it does not seem to have been recorded from Bookham Common. I am grateful to Mr P. C. Holland for confirming the identification.

9. Crater Pond, shown in a 1950 photograph as in the centre of an open grassy space, was traced only with difficulty in early 1972 as

a dried-up hollow in dense developing scrub. At the request of the survey team, Mr E. F. Youngman, the Keeper of the Common, has cleared all the scrub from the hollow, the space between it and Common Road, and a wide margin up to five metres on the other sides. In December, after a rainy spell, there was once more water, although very turbid, to be seen in this once interesting pond (see *Lond. Nat.* **34:** 16-21 (1955) and **42:** 93-94 (1963).

Pond Biology (A. E. Le Gros)

A long term investigation was begun in 1972 to consider the origin of the flora and fauna of the temporary ponds, with particular reference to Bayfield, Crater and the gun-pits. Bayfield as a temporary pond has existed for at least a century and we can accurately date Crater Pond to the winter of 1940-1941 and the gun-pits to the winter of 1943-1944. From where came the liverwort *Riccia fluitans* first found on the Common in Sheepbell Pond in 1954 and which later became established in Bayfield and South Eastern Ponds, and has been seen in other ponds? It is hoped to examine which are the agents that bring plants and animals to a pond, and which other agents disperse them to other localities on the Common. The flora and fauna are to be compared to assess whether the older temporary ponds have richer or different life to the younger ponds, and they will be grouped into two categories. Firstly, those species which are able to survive the drying up of the ponds and so become established, and secondly, those species which cannot survive desiccation and must be re-introduced regularly.

Samples of mud and vegetable debris have been taken from the middle of the dried up or damp bottoms of several ponds and gun-pits in November for study. A sample from Crater Pond when placed in water produced in forty-eight hours an active population of mosquito larvae (*Aedes* sp.), copepod nauplii (*Diaptomus castor*), waterfleas (*Daphnia pulex*), ostracods (*Cyclocypris ovum*), bdelloid rotifers and several species of algae.

Crustacea - Amphipoda (A. E. Le Gros)

There are two species of freshwater shrimps at Bookham, *Gammarus pulex* (L.) and *Crangonyx pseudogracilis* Bousfield. The latter, an introduced North American species, first found in Middlesex in the 1930s and now widely distributed in the London Area, was first recorded (as *Eucrangonyx gracilis* Smith) by A. E. Ellis *Lond. Nat.* **27:** 60 (1948)) who noted it in "I. of W. Pond, Upper East Pond and a pond just inside the Isle of Wight boundary hedge, at the extreme south edge of square 57". It is now to be found in most of the ponds, gunpits and bomb craters. Smaller than *Gammarus pulex* it competes with it in the Hollow Ponds and appears to be more tolerant of still water. Its distribution at Bookham raises a query. Neither *Crangonyx pseudogracilis* nor its eggs can survive the drying up of

its habitat, and many of its habitats dry up hard most years. Yet with rainwater refilling the gun-pits the shrimps appear in numbers. How are fresh specimens introduced? It has long been known that some amphipods obtain transport by clinging to the feathers of waterfowl but one rarely sees a mallard visiting a gun-pit. But one does frequently see a dog wade into the main ponds and then visit a gun-pit or bomb crater. I suggest that dogs may be principal agents of distribution. H. B. N. Hynes (*New Biology* **21:** 31 (1956)) thought *C. pseudogracilis* to be "apparently entirely vegetarian". This is not so as it will readily capture water-fleas.

Gammarus pulex, a darker muddy coloured species, prefers running water. It is to be found in Bookham Stream, the three main ditches (Isle of Wight, Central and Greendell) and the Hollow Ponds. I have never found it in a gun-pit or bomb crater, nor in the larger temporary ponds such as Bayfield. Though egg-bearing females have been found at different times of the year, the habit of pre-copula which is preceded by the male carrying the female around for days, at Bookham seems to occur mainly in February and late summer.

Other Crustacea (J. W. Coles)

The following species were collected in 1969 from the Isle of Wight Pond and are additional to those recorded previously (*Lond. Nat.* **37:** 58 (1958), **48:** 129-130 (1969), and **50:** 103 (1972)) with the exception of *Scapholeberis mucronata* (O.F.M.) taken from the Isle of Wight Pond in September 1957 and in May 1968.

Cladocera. *Chydorus latus* Sars and *Scapholeberis mucronata* var. *cornuta* Schoedler

Ostracoda. *Candona vavrai* Kaufmann and *Cyclocypris laevis* (O.F.M.)

Copepoda-Cyclopoida. *Eucyclops macrurus* (Sars)

All were identified by Mr G. M. Bennell.

Arachnida-Araneae (A. E. Le Gros)

The beautiful and rare orb-web spider *Araneus alsine* (Walck.) was first reported from Surrey by Nellist in *Bull. Brit. Arach. Soc.* **1:** 55-60 (1969), being found in August 1968 at Chobham Common, at Happy Valley on Box Hill and at White Downs. Mr D. Macer-Wright however tells me that he found two females (determination confirmed by the late Douglas Clark) at Bookham in September 1951 and that one specimen is now in the British Museum (Natural History) collections. All these Surrey records are from habitats in a comparatively small area and it is surprising that such a conspicuous spider has not been recorded more often. Is it extending its range?

Chalcids and Spiders (A. E. Le Gros)

In the years 1952-1955 the spider *Araneus cornutus* Clerck was far more common and widespread at Bookham than it is today, and I was able to observe its retreats built on *Sparganium* which was plentiful then in Isle of Wight Pond (see *Lond. Nat.* **33**: 3-4 (1954)). The spider lays her eggs in a rear compartment of her retreat and seals it with a silk sheet. However the eggs are attacked by the ichneumon egg predators *Ischnurgops geniculatus* Thomson and *Tromatobia* spp. These in turn I found were heavily parasitized by a eulophid chalcid, which I was able to rear in large numbers and which Dr Z. Boucek has determined as *Pediobious brachycerus* Thomson. This species was first recognized as British by Dr M. W. R. de V. Graham (*Trans. Soc. Br. Ent.* **13**: 191 (1959)) from specimens collected in Oxfordshire but the present record is believed to be the first of the chalcid's hosts.

Insects-Hemiptera (A. E. Le Gros)

D. Leston in *Lond. Nat.* **31**: 49-62 (1952) in his notes on the plant and water bugs of the Common admits the incompleteness of his list and further work on the group should prove fruitful. Two surprising omissions are the water cricket *Velia caprai* Tamanini and the tiny waterbug *Micronecta scholtzi* (Fieber).

Females of *Velia caprai*, often wingless, are erratic in their distribution and in their appearance. They turn up in the gun-pits, in Crater Pond, and in the main ponds; they regularly occur in the ditches in late summer in places where the flow of water is slow. *Micronecta scholtzi* has been found to be an abundant species in Isle of Wight and Lower Eastern Ponds every year since 1968.

Insects-Mecoptera (A. E. Le Gros)

Panorpa germanica L., which has not been recorded from the Common for many years, was seen again on the Station platform on 18 May 1972, where two males had flown in from Station Copse.

Insects-Microlepidoptera (A. E. Le Gros)

With the receipt of records sent to me by A. M. Emmet, W. H. Spreadbury, F. M. Struthers, H. G. Tunstall and R. W. J. Uffen the list has now reached 83 species. If any lepidopterist would like to study the microlepidoptera of the Common I would be pleased to send him a copy of the list.

Birds (G. Beven)

Population Studies in Oak-wood

The breeding season census was repeated in the 16 hectare (40-acre) sample of dense interior pedunculate oak-wood (Eastern Wood). The number of territories of singing males of selected species over the last 10 years is shown in Table 1.

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Great tit	12	17	17	12	16	19	14	13	13	12
Blue tit	19	19	22	17	16	20	19	20	15	16
Coal tit	2	5	4	3	8	6	7	5	4	7
Marsh tit	3	1	1	3	3	3	3	3	2	2
Long-tailed tit	0	0	1	2	2	1	1	2	3	2
Nuthatch	2	5	5	5	7	5	3	5	5	4
Treecreeper	1	1	2	2	2	4	4	3	5	3
Wren	1	5·5	11	17	25	26	24	25	17	26
Mistle thrush	2	2	3	2	1	1	2	2	2	2
Song thrush	4	7	7	8	10	7	7	7	9	6
Blackbird	8	10	12	11	12	11	13	9	14	12
Robin	21·5	32	37	37	42	43	44	36	44	37
Blackcap	5	3	4	7	6	3	6	1	3	4
Garden warbler	2	2	4	1	1	1	1	1	0	0
Willow warbler	2·5	1·5	4	4	2	6	2	2	0	0
Chiffchaff	2	5	7	6	6	3	3	4	1	1
Dunnock	4	5	5	4	8	6	6	3	2	1
Starling	5	5·5	10	6	8	12	7	8	8	6
Chaffinch	5·5	7	8	7	6	4	4	3	6	8

TABLE 1. The number of territories of singing males of selected species in Eastern Wood each year.

The stock dove territory is the first to be recorded in Eastern Wood since the full census began in 1950, although this species is well established in the oak-woods to the north of the Common. The wren has regained its previous high population which may well be the highest density possible in the wood. The previous winter was again classified as fairly mild, although there was a rather late cold spring. Redpolls occupied two territories in the wood, also for the first time since 1950. Does this mean that, having established themselves in the open birch areas of scrub, they are attempting to invade the dense oak-wood? The well marked waxing and waning of the chaffinch population in the oak-wood continues, with peaks in 1951, 1965 and 1972, whereas the population variation in scrub and grassland does not seem to show the same pattern.

During the 23 years of the full census of Eastern Wood since 1950, 44 species have bred or attempted to do so. The total number of breeding species in any one year varied from 28 to 35, and singing male territories varied from 125 to 210, i.e. 307 to 525 territories per 100 acres (or perhaps 614 to 1050 birds average 818 per 100 acres, assuming all were mated).

Scrub and Grassland

The spring census of the number of territories of singing males was again made on 39 hectares (96 acres) of scrub and grassland in 1972 (G. B. and W. D. Melluish). The number of territories of selected species over the last nine years is shown in Table 2.

	1964	1965	1966	1967	1968	1969	1970	1971	1972
Pheasant	2	2	3	3	2	7	3	5	7
Woodpigeon	1	2	4	1	1	6	3	5	7
Turtle dove	5	4	3	5	3	7	4	8	12
Green woodpecker	0	1	4	4	4	1	1	1	1
Long-tailed tit	2	3	4	5	6	6	5	4	6
Wren	2	3	9	10	15	14	18	14	22
Song thrush	8	8	7	10	9	9	14	15	13
Blackbird	15	8	13	17	15	15	20	15	16
Robin	23	23	15	21	23	23	22	18	21
Nightingale	1	0	2	3	4	4	5	4	5
Grasshopper warbler	2	4	6	4	5	6	5	5	4
Whitethroat	12	17	17	22	16	11	14	12	13
Willow warbler	20	14	19	27	21	26	14	18	22
Dunnock	11	15	13	18	12	12	13	10	13
Linnet	1	4	4	4	1	2	0	1	0
Redpoll	2	3	5	4	4	6	6	4	4
Chaffinch	18	13	13	14	9	12	17	11	14
Yellowhammer	9	7	9	7	8	7	5	8	7
Reed bunting	3	2	5	6	5	3	3	5	5

TABLE 2. The number of territories of singing males of selected species in scrub and grassland each year.

The increasing population of woodpigeon and especially turtle doves may be associated with increased maturity of many of the shrubs and small trees in the scrub. The wren population is higher than at any time since 1964 and probably since 1954, although a complete census was not done between 1954 and 1964. Linnets seem to be disappearing from the scrub, but the reason is not known.

The Status of the Marsh and Willow Tits on Bookham Common

Two resident species, the marsh tit *Parus palustris* and the willow tit *P. montanus*, are so similar in appearance that there is some confusion regarding their status and relative abundance in Surrey. An analysis of records sent to the Surrey Bird Club in the years 1960-69 suggested that the willow tit was the more widely distributed and numerous of the two species (Parr, D. 1972. *Birds in Surrey*. London). It may be of interest therefore to examine their status on Bookham Common.

In 96 acres of grassland-scrub the number of spring territories of marsh tit and willow tit respectively in 1964 was 0, 1; in 1965 0, 2; 1966 3, 0; 1967 1, 0; 1968 1, 1; 1969 1, 3; 1970 1, 2; 1971 0, 3; and 1972 1, 2. Thus the numbers of each species varied from 0 to 3 territories, with an average of one marsh tit territory and 1·6 willow tit territories (per 100 acres). In the 40 acre sample of dense oak-wood (Eastern Wood) during 24 years between 1949 and 1972, the number of territories of marsh tits varied from 1 to 5, average 2·8

(or 2·5 to 12·5 per 100 acres, average 7), and of willow tits varied from 0 to 2, average 1 (or 0 to 5 per 100 acres, average 2·5). The annual figures for the grassland-scrub are a little suggestive of some competition between the two species. However when the oak-wood territory maps are compared it is apparent that 14 of the 22 willow tit territories do not overlap with those of the marsh tit, although there is at least partial overlap in the remaining eight territories. This suggests a degree of horizontal spatial separation which may help the two species to co-exist in Eastern Wood during the breeding season. Although J. M. and M. A. Edington have demonstrated complete spatial separation in some other woodland species in spring, they also found that territories of great tit, blue tit, marsh tit and coal tit showed overlaps, but the areas these species used for collecting food for their young were mutually exclusive (*J. Anim. Ecol.* **41:** 331-357 (1972)). There is no data on these feeding areas in Eastern Wood.

Thus it appears that in the low-lying grassland scrub of the alluvial plain the willow tit is more numerous than the marsh tit, while the latter is on average about three times as abundant as the willow tit in the oak-wood. In the south of England the habitat of the willow tit seems not to be clearly distinguishable from the marsh tit's, although willow tits are said to prefer damp wooded commons, especially if there are small rotten boughs or birch stumps in which they can bore a nest hole. The marsh tit uses natural holes in trees. The willow tit's preference for a wetter habitat is borne out by the fact that, over 23 years, 16 out of 22 of their territories were situated in the more low-lying and damper southern half of Eastern Wood, while the marsh tit territories seem to be more evenly distributed, only half being in the lower half of the wood (32 out of 65). However, Eastern Wood being close to the ponds and marshy hollows may not be typical of the woodland as a whole, much of which is higher and not quite so damp, so that willow tits may possibly be even less numerous in the whole wood than is suggested by census figures based on the Eastern Wood sample.

Feeding niche studies on Bookham Common suggest that although both species feed in trees, shrubs, in the herb layer and on the ground, the marsh tits tend to feed rather nearer the ground and more often on the ground than willow tits, in both oak-wood and scrub (*Lond. Nat.* **43:** 86-109 (1964)). However more work on this aspect is required. Similar feeding habits are reported by J. Gibb in oak-wood (*Ibis* **96:** 513-543 (1954)) and in broad-leaved woods in Switzerland by F. Amann, the willow tit feeding almost entirely on insects and only a few small seeds, whereas the marsh tit with its stronger beak hammers on bark and eats a variety of fairly hard seeds (Lack, D. 1971. *Ecological Isolation in Birds.* Oxford).

Other Notes on the Birds

A pair of little grebes was present on the Isle of Wight Pond in

spring. A pair of gadwall, *Anas strepera*, was reported on Lower Eastern Pond in early May by D. Macer-Wright; this is apparently the first record for the Common. A flock of 17 mandarin duck flew over the main ponds in January, at least one pair remaining on the ponds or in Eastern Wood until April. Two young were produced by a pair of coot on the Isle of Wight Pond. At least two woodcock were roding in the spring. Barn owl pellets on Kelsey's Farm, just north of the Common, contained bones of one wood mouse, five field voles, a song thrush, and two thrushes ?sp. A little owl was calling in Kelsey's Wood on 10 September 1972. The bones of seven frogs were found in the pellets of tawny owls on 25 March. A pair of lesser spotted woodpeckers were displaying in March and drumming was heard in April. A blue tit was found hanging by its neck from the twig of an oak tree by the Isle of Wight Pond on 20 May 1972; a long piece of very fine nylon thread was tightly twisted round and round the bird's neck, and needed cutting to release the dying bird. Presumably the tit became entangled accidentally. If so this incident illustrates a hazard to small birds from nylon thread, which is used by anglers and may have been left lying about.

On 26 and 27 May 1951 a woodchat shrike, *Lanius senator*, was seen on the Common by A. R. F. Hills and E. Giles (*Brit. Birds* **45:** 258 (1952)). This is the only record of the species for the Common and was not included in the last checklist of birds (*Lond. Nat.* **42:** 98-100 (1963)).

Changes in the Lichen Flora of Bookham Commons with Increased Air Pollution and Other Factors

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Synopsis

The status of the epiphytic lichen flora from 1953-56 and from 1969-73 is compared. Forty-eight species were recorded in the former period and 36 in the latter interval. Twenty-five per cent. of the species have become extinct since 1956; all were formerly local or scarce. Some lichens which were common have decreased dramatically, whilst other species show no apparent decline. No lichens show any notable increase in status.

The *Xanthorion* has disappeared from its two main habitats on the plains due to the cessation of grazing and the decline in eutrophication; it survives on an elm exposed to roadside dust. The *Conizaeoidion* has replaced the *Physodion* in much of Central Wood. As the woodland is little altered and it is the species which are more sensitive to sulphur dioxide which have declined, the reduction can be attributed to increased air pollution. An analysis of sulphur dioxide shows that there has been no general increase in concentration for the peripheral suburbs of south-west London, and therefore the increased pollution would appear to be of local origin. The population of Bookham and Fetcham has doubled since 1951, with substantial residential infilling having occurred to the south of the Commons. The decline in the epiphytic lichen flora would appear to be due to increased sulphur dioxide emissions from this infilling.

Terricolous lichens appear to have been exterminated by increased competition from higher plants, but the saxicolous lichen flora remains undiminished.

Introduction

Bookham Commons comprise Great Bookham Common, Little Bookham Common and Bank's Common, which lie adjacent to each other in grid square TQ 15 three kilometres west of Leatherhead in Surrey. The lichen flora of the Commons was studied in detail from 1953-56 as part of the Bookham Common Survey, which excludes much of Bank's Common. The area was found to be remarkably rich in lichens, with 73 species recorded, considering that it is situated only 29 km (18 miles) from the centre of London at Charing Cross. Over half the Commons are covered with semi-natural oak (*Quercus robur*) woodland, which was found to have the best epiphytic flora remaining in the London Area. See Laundon (1958) for an account of the lichen vegetation.

After 1956 no lichen studies were carried out at Bookham until Dr F. Rose and Mr P. A. Stott visited the Commons in 1969. Dr Rose (in litt.) reported "a serious deterioration in the lichen flora . . . at least on trees," with most lichens "in poor condition". His remarks prompted me to make further visits to the Commons in 1972 and 1973, on which I was able to confirm Dr Rose's statement. The decline in the epiphytic lichen flora since 1956 is so dramatic that it was felt to be worthy of special study.

The Epiphytic Lichen Flora

A list of all lichens found growing on bark and wood at Bookham Commons from 1953 to 1956 and from 1969 to 1973 is given below, with their respective status for the two periods. The nomenclature is based on James (1965) with later corrections, and names used in Laundon (1958) which are now synonyms are given in parenthesis. An asterisk (*) denotes a new corticolous record for the Commons. Species which appear to be extinct on bark and wood are given in square brackets ([ ]). Records in quotations (" ") are quoted from Laundon (1958). Where no recorder is given, the records are my own. The localities on the Commons are shown in Fig. 1.

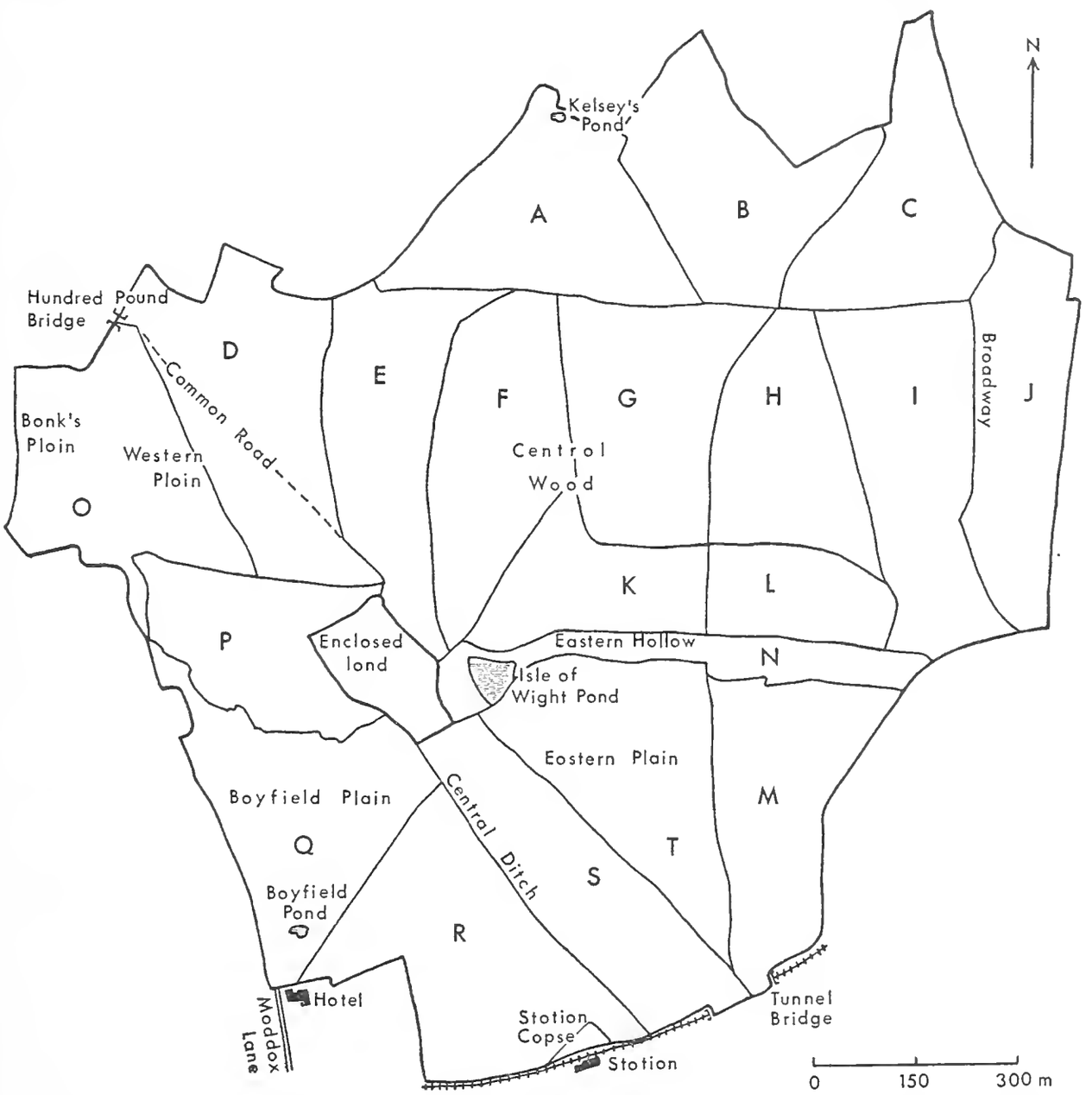

FIG. 1. Bookham Commons, showing locations and areas mentioned in the text. Areas A—M are chiefly woods, area N is a hollow with ponds, and areas O—T are chiefly plains and scrub.

[*Buellia canescens* (Dicks.) de Not. **1953-56:** "Local. Abundant on willow, Bayfield Pond; scarce on elm, Station Copse and one plant at base of oak near Tunnel Br."]

B. punctata (Hoffm.) Massal. (*B. myriocarpa* (DC.) de Not.) **1953-56:** "Local. Abundant on willow, Bayfield Pond; scarce on elm,

Station Copse and on oak by Common Rd., area D." **1969-73:** Local. Scarce on willow at Bayfield Pond; several plants on roadside elm in area Q opposite Maddox Lane.

[*C. ilicium subtile* Pers. **1953-56:** "Rare. Decorticated trunk, Broadway."]

[*C. viride* Pers. **1953-56:** "Rare. On old oaks, areas E and F."]

Catillaria griffithii (Sm.) Malme **1953-56:** "Occasional on oak throughout the woods but abundant in area I." **1969-73:** Scarce. On oak in areas I & K.

Chaenotheca ferruginea (Turn. ex Sm.) Mig. (*C. melanophaea* (Ach.) Zwackh) **1953-56:** "Frequent, chiefly on the north side of old oaks." **1969-73:** Occasional on the north side of old oaks.

[*Cladonia bacillaris* (Ach.) Nyl. **1953-56:** "Rare. At base of oak, area F."]

C. coniocraea (Flörke) Spreng. **1953-56:** "Frequent. Common at the base of trees, especially birch and oak." **1969-73:** Frequent at the base of trees.

C. fimbriata (L.) Fr. **1953-56:** "Scarce on trees and stumps in the woods." **1969-73:** Local. Many plants on old willow at Bayfield Pond.

[*C. macilenta* Hoffm. **1953-56:** "Rare. Decorticated trunk, area S."]

Evernia prunastri (L.) Ach. **1953-56:** "Frequent on oak boles, especially in Central Wood." **1969-73:** Scarce; seen only on two trees in area F, and on old willow at Bayfield Pond.

[*Graphis elegans* (Borr. ex Sm.) Ach. **1953-56:** "Rare. Young oak, area G."]

Hypogymnia physodes (L.) Nyl. (*Parmelia physodes* (L.) Ach.) **1953-56:** "Abundant on oak boles and branches in Central Wood, occasional elsewhere." **1969-73:** Occasional on branches and about 50 boles; it is now most common in area G of Central Wood, where it extends up the trunks.

[*H. tubulosa* (Schaer.) Hav. (*Parmelia tubulosa* (Schaer.) Bitt.) **1953-56:** "Rare. Sallow, Kelsey's Pond, area A; oak branch, area F."]

Lecanora chlarona (Ach.) Nyl. **1953-56:** "Occasional on young ash, birch and oak throughout the woods." **1969-73:** Scarce. On a few trees only.

L. chlarotera Nyl. **1953-56:** "Rare. On oak, area K." **1969-73:** Rare. A few plants on roadside elm in area Q opposite Maddox Lane.

L. conizaeoides Nyl. ex Cromb. **1953-56:** "Abundant on trees and shrubs." **1969-73:** Abundant.

[*L. dispersa* (Pers.) Sommerf. **1953-56:** "Scarce on willow at Bayfield Pond."]

L. expallens Ach. **1953-56:** "Common on trees, especially immature ash and old oaks." **1969-73:** Frequent.

Lecidea granulosa (Hoffm.) Ach. (*L. flexuosa* (Fr.) Nyl.) **1953-56:** "Occasional" on decaying bark and wood. **1969-73:** Scarce. On decorticated rotting stumps in areas A & J. On old willow at Bayfield Pond.

L. quernea (Dicks.) Ach. **1953-56:** "Rare. On willow, Bayfield Pond." **1969-73:** Scarce. Several plants on willow at Bayfield Pond. On one old oak, *F. Rose.*

[*L. scalaris* (Ach.) Ach. **1953-56:** "Scarce. Decorticated trunks, areas I and S."]

[*L. uliginosa* (Schrad.) Ach. **1953-56:** "Scarce . . . decorticated stump, area S."]

[*Lecidella elaeochroma* (Ach.) Choisy (*Lecidea olivacea* Massal.) **1953-56:** "Rare. Immature *Betula pubescens*, Eastern Plain."]

NOTE: Hertel & Leuckert (1969), in their account of *Lecidella*, give Hazslinszky (1884) as the author of the combination *Lecidella elaeochroma*. An examination of Hazslinszky's book shows that he made no such combination, but instead included the species under *Lecidea elaeochroma*. Therefore the combination *Lecidella elaeochroma* should be attributed to Choisy (1950).

[*Lepraria candelaris* (L.) Fr. **1953-56:** "Local. Confined to crevices in old oak boles, areas A, I, K and N."]

L. incana (L.) Ach. (*L. aeruginosa* auct., non (Weiss) Sm.) **1953-56:** "Common on trunks and branches in shaded situations." **1969-73:** Abundant in shade.

Ochrolechia androgyna* (Hoffm.) Arnold **1969-73: Rare. One plant on oak, area A.

O. turneri (Sm.) Hasselr. **1953-56:** "Rare. On willow by Bayfield Pond. Fertile." **1969-73:** Local. Many plants on old willow at Bayfield Pond. Sterile.

[*O. yasudae* Vain. (*O. subviridis* (Høeg) Erichs.) **1953-56:** "Rare. On willow by Bayfield Pond."]

Parmelia caperata (L.) Ach. **1953-56:** "Frequent on lower part of oak boles especially in Central Wood." **1969-73:** Rare. One small patch 3 cm diameter on old oak bole at side of Broadway in area J, 1973.

[*P. glabratula* (Lamy) Nyl. subsp. *glabratula* (*P. fuliginosa* var. *laetevirens* (Flot. ex Körb.) Nyl.) **1953-56:** "Scarce. On sallow, Bayfield and Kelsey's Ponds."]

[*P. revoluta* Flörke **1953-56:** "Local. Occasional amongst mosses at the base of old oaks, area F."]

P. saxatilis (L.) Ach. **1953-56:** "Scarce. On moss-covered branch, area B." **1969-73:** Scarce. On one bole in area F. On branches, *F. Rose*.

P. subaurifera Nyl. **1953-56:** "Occasional on oak boles and on sallow in the woods." **1969-73:** Scarce. A few plants on old willow at Bayfield Pond. One plant on elm in Station Copse.

P. subrudecta Nyl. (*P. dubia* (Wulf.) Schaer.) **1953-56:** "Scarce." Four localities. **1969-73:** Scarce. On two boles in area F. A few plants on old willow at Bayfield Pond.

P. sulcata Tayl. **1953-56:** "Abundant on oak boles at the margin of the woods, scarce in the interior; frequent on oak branches and on sallow." **1969-73:** Scarce. Now present on only a few trees in the woods, but still abundant and extending high up the trunks on old willows at Bayfield Pond, Isle of Wight Pond, and (to a lesser extent) Kelsey's Pond.

[*Pertusaria albescens* var. *corallina* (Zahlbr.) Laundon (*P. globulifera* var. *corallina* Zahlbr.) **1953-56:** "Rare. Oak, area K."]

P. amara (Ach.) Nyl. **1953-56:** "Occasional on oak boles, scarce on branches." **1969-73:** On a few trees.

P. hemisphaerica (Flörke) Erichs. **1953-56:** "Rare. On oak, area N." **1969-73:** Rare. One plant in Central Wood.

P. hymenea* (Ach.) Schaer. **1969-73: Scarce. On two oaks.

P. pertusa (L.) Tuck. **1953-56:** "Occasional on oak boles." **1969-73:** Scarce. Still present on a few boles.

Phlyctis argena (Spreng.) Flot. **1953-56:** "Local. On the north side of old oaks, areas E, I, and K. Scarce on elm, Station Copse." **1969-73:** Scarce.

Physcia adscendens (Th. Fr.) Oliv. **1953-56:** "Local . . . locally frequent on willow, Bayfield Pond." **1969-73:** Rare. Several plants on roadside elm in area Q opposite Maddox Lane.

P. orbicularis* (Neck.) Poetsch **1969-73: Rare. Several plants on roadside elm in area Q opposite Maddox Lane.

P. tenella (Scop.) DC. **1953-56:** "Rare. Frequent on elm, Station Copse." **1969-73:** Local. Numerous plants on roadside elm in area Q opposite Maddox Lane.

[*P. tribacia* (Ach.) Nyl. **1953-56:** "Local. Abundant on willow, Bayfield Pond."]

Physconia grisea (Lam.) Poelt (*Physcia grisea* (Lam.) Zahlbr.) **1953-56:** "Very local. Abundant on two elm trees in Station Copse." **1969-73:** Rare. One plant on roadside elm in area Q opposite Maddox Lane.

Platismatia glauca (L.) Culb. & Culb. (*Cetraria glauca* (L.) Ach.) **1953-56:** "Scarce. Decayed oak branches, areas F and K; sallow

in Eastern Hollow, area N." **1969-73:** Scarce. On branch, area F. Several plants on oak bole in area J.

[*Ramalina farinacea* (L.) Ach. **1953-56:** "Rare. Scarce on willow, Bayfield Pond."]

Rinodina exigua* (Ach.) Gray **1969-73: Rare. A few plants on roadside elm in area Q opposite Maddox Lane.

Schismatomma decolorans* (Turn. & Borr. ex Sm.) Clauzade & Vezda **1969-73: Occasional. Fairly abundant on a few very old oaks, especially north of Isle of Wight Pond and north-west of Tunnel Bridge, *F. Rose*.

Usnea cf. *subfloridana* Stirt. (*U. comosa* (Ach.) Vain.) **1953-56:** "Rare. On oak, area G; on sallow, Eastern Hollow, area N. Specimens very small." **1969-73:** Rare. On sloping bole of willow by Central Ditch, area S. Plant 3 mm long.

Xanthoria candelaria (L.) Th. Fr. **1953-56:** "Rare. At base of oak, Common Road, area D." **1969-73:** Local. Numerous plants still present at base of oak in centre of Common Road, area D.

X. parietina* (L.) Th. Fr. s. str. **1969-73: Rare. Three small plants on roadside elm in area Q opposite Maddox Lane.

Changes in the Epiphytic Flora

Between 1953 and 1973, 54 species of lichens were found growing on bark or wood in the area. Forty-eight of these were recorded between 1953 and 1956, and 36 between 1969 and 1973. Thus 25 per cent. of the epiphytic lichen flora has apparently disappeared since 1956. The 18 species which no longer appear to be present on bark or wood are *Buellia canescens*, *Calicium subtile*, *C. viride*, *Cladonia bacillaris*, *C. macilenta*, *Graphis elegans*, *Hypogymnia tubulosa*, *Lecanora dispersa*, *Lecidea scalaris*, *L. uliginosa*, *Lecidella elaeochroma*, *Lepraria candelaris*, *Ochrolechia yasudae*, *Parmelia glabratula*, *P. revoluta*, *Pertusaria albescens*, *Physcia tribacia* and *Ramalina farinacea*, all of which were formerly either local or scarce. It is likely that a few of these in fact persist, but have not been located. Lichens which were not found as epiphytes in the period 1953-56 but which are present today are *Ochrolechia androgyna*, *Pertusaria hymenea*, *Physcia orbicularis*, *Rinodina exigua*, *Schismatomma decolorans* and *Xanthoria parietina;* it is probable that some of these were present but were unnoticed in the earlier period. It appears likely that a similar number of species were overlooked in both the 1953-56 and 1969-73 surveys, and that the 25 per cent. decline is therefore a reality.

Although only local or scarce species have disappeared, some lichens which were formerly common have declined dramatically. To this group belong *Catillaria griffithii*, *Evernia prunastri*, *Hypogymnia physodes*, *Parmelia caperata*, *P. sulcata* and *Pertusaria amara*. Of these *Evernia* was frequent in 1956 but is now present in only two

localities on the Commons, whilst *Parmelia caperata* formed large thalli on some fifty trees but now survives only as a small patch on a single oak. The decline in *Parmelia sulcata* is equally dramatic: it survives only in habitats of high humidity, chiefly on old willows around the ponds. Several other lichens (i.e. *Lecanora chlarona*, *Lecidea granulosa*, *Parmelia subaurifera* and *Pertusaria pertusa*) also show a noteworthy, if less spectacular, decline. On the other hand some common lichens (i.e. *Cladonia coniocraea*, *Lecanora conizaeoides*, *L. expallens* and *Lepraria incana*) show no apparent decrease, and neither do a number of scarce species (i.e. *Lecanora chlarotera*, *Lecidea quernea*, *Ochrolechia turneri*, *Parmelia saxatilis*, *Pertusaria hemisphaerica*, *Platismatia glauca*, *Usnea subfloridana* and *Xanthoria candelaria*). No lichen shows any notable increase in status since 1956.

With such a decline in the lichen flora having occurred on the Commons, it follows that the lichen communities have suffered a corresponding fate. The nitrophilous lichen community *Xanthorion* has disappeared from the two main localities on the plains in which it occurred in 1956: the willow trees around Bayfield Pond and two of the elms in Station Copse (Laundon 1958: 67, 74). This extinction is not due to increased air pollution, because the *Xanthorion* survives on the edge of the plains where roadside dust impregnates the bark (see below). In 1956 the plains were chiefly damp acid grassland dominated by *Deschampsia cespitosa*, and the presence of the *Xanthorion* was attributed to the former occurrence of excreta from grazing cattle, horses and sheep which roamed until all grazing ceased in about 1949 (see Beven 1972: 23). Today the plains are covered with hawthorn scrub (except where clearance has been carried out), the result of the cessation of grazing and the decline in rabbits due to myxomatosis (Beven 1972: 23). This change has resulted in a decrease in eutrophication, so that the *Xanthorion* has given way to the nitrophobous community *Physodion*, dominated by *Parmelia sulcata*, at Bayfield Pond, and to its complete disappearance from Station Copse, where all boles are now covered in green algae or ivy, with some *Lepraria incana*. It is interesting to note that on the willow trees at Bayfield Pond in 1956 some nitrophobous species (i.e. *Parmelia glabratula*, *P. sulcata*) were already common along with the nitrophilous lichens *Buellia canescens*, *B. punctata*, *Physcia adscendens* and *P. tribacia* (Laundon 1958: 74), evidently already indicating that a change from eutrophication was under way; of the last four species only a few plants of *Buellia punctata* now remain.

In spite of this decline, nitrophilous lichens still occur on trees in two places. On Western Plain *Xanthoria candelaria* remains at the base of an oak in the centre of the bridle-path called Common Road, its occurrence doubtless due to the presence of excreta from passing dogs and rabbits. On Bayfield Plain the community *Xanthorion* is well-developed at the base of one roadside elm opposite Maddox Lane near the Bookham Grange Hotel. Here *Buellia punctata*,

Physcia adscendens, *P. orbicularis* and *P. tenella* are common. This locality for the *Xanthorion* was not recorded during the 1953-56 survey, but may have been overlooked. The community owes its presence to the churning up by passing vehicles of roadside dust, which is then blown on to the bark. The pH of the bark is thereby increased (Barkman 1958: 107), and as wayside dust appently contains nitrates (Barkman 1958: 103), a nitrophilous lichen flora develops. Despite an extensive search in 1973, nitrophilous lichens were not found elsewhere on the Commons.

The decline in nitrophobous communities is most marked. In 1956 the *Physodion* was especially well-developed in the lower part of Central Wood where "*Evernia prunastri*, *Parmelia caperata*, *P. physodes* and *Pertusaria amara* clothe the trunks while *Parmelia physodes* and *P. sulcata* are abundant on the larger branches" (Laundon 1958: 73). Today the majority of these same trunks are occupied by the community *Conizaeoidion*, and only *Lecanora conizaeoides*, *L. expallens*, *Lepraria incana*, algae and bryophytes occur on the bark. The spectacular decline in *Parmelia caperata* recalls its extinction in Newell Wood, Rutland, where it was abundant in 1943 but absent by 1970 (Sowter & Hawksworth 1970: 96); in a number of woods (e.g. Monks' Wood, Huntingdon & Peterborough) in eastern England this species now survives as a relict on only a few scattered old trees and appears unable to form new colonies. It now appears to be confined to a single tree at Bookham, and therefore appears likely to become extinct. The best lichen flora on the Commons now occurs on the willow trees at the ponds, where the high pH value of the bark, and the inclined trunks in humid situations provide a lower evaporation rate from the bark, factors which are advantageous to the development of a good epiphytic flora.

The decline in the *Physodion* at Bookham is evidently not due to habitat changes, because the woodland has altered little since the survey was begun in 1953. As it is the species (e.g. *Evernia prunastri*, *Parmelia caperata*) which are more sensitive to sulphur dioxide air pollution which have declined, and the species (e.g. *Cladonia coniocraea*, *Lecanora expallens*) which are less sensitive survive unchanged, it appears reasonable to attribute the decline to increased air pollution. The scale published by Hawksworth & Rose (1970) shows that the lichen flora has changed from zone 6, denoted by the presence of *Parmelia caperata* at the base of trees, in 1956, corresponding to a winter level of about 50 ug/m^3 of sulphur dioxide, to zone 5, denoted by *Hypogymnia physodes* extending up the trunks, by 1969, corresponding to a winter level of about 60 ug/m^3 of sulphur dioxide. Unfortunately no actual measurements of sulphur dioxide have been carried out near the Commons, so that the levels themselves are not accurately known.

As the evidence from changes in the lichen vegetation indicates that air pollution on the Commons has increased between 1956 and

1969, it is important to establish the reasons for this rise. The Commons lie immediately to the south-west of London, so that the increase in pollution may be either from London itself, or may be of local origin, or perhaps both. In recent years there has been a significant alteration in the weather pattern over the country, with a marked decline in the westerly type of weather (Lamb in Perring 1970: 17-18), and also of course a decline in westerly winds. Thus with winds from other directions increasing, a rise in sulphur dioxide pollution from London would appear likely. In order to establish whether such a rise took place an analysis of average levels of sulphur dioxide pollution for the outer edge of the suburban ring of south-west London during the years in question was carried out (Fig. 2), because pollution from London would affect this area before it reached Bookham Commons. The average levels were calculated from the yearly mean readings of sulphur dioxide concentrations published by Warren Spring Laboratory, Stevenage, in their annual report *The Investigation of Air Pollution*, for recording stations in an arc from Kingston upon Thames to Carshalton; there is a lack of records before 1965 and after April 1971 (because of power disruptions and their effects on instruments) for some of the stations so that one is unable to cover more than the limited period for the years ended March 1966 to March 1971. The graph shows that the average concentration of sulphur dioxide to the south-west of London has remained fairly constant over this period, with no sign of a general decrease or a general increase. This maintenance of the level of sulphur dioxide compares with a general decline for London as a whole (Warren Spring Laboratory 1972: 22). As the graph indicates a lack of increase in sulphur dioxide from London reaching the south-west peripheral suburbs, it would appear that the increase in pollution at Bookham Commons does not originate from London, and must therefore be of local origin.

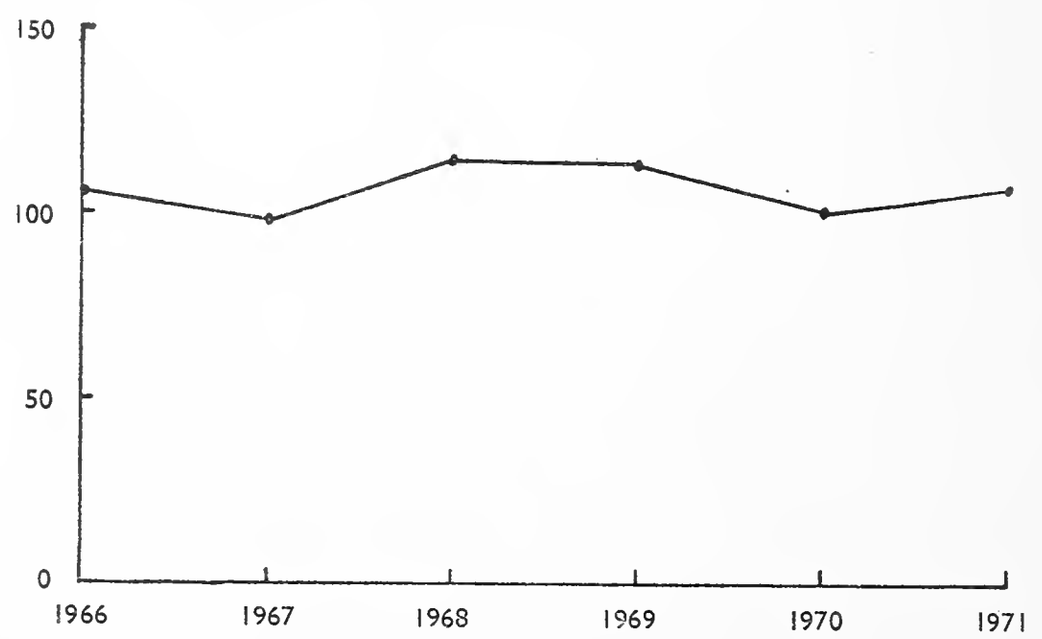

FIG. 2. Average (=mean) concentration of sulphur dioxide air pollution for the peripheral suburbs of south-west London for the years ended March 1966 to March 1971. The average is of six sites: Carshalton 4, Epsom 1, Ewell 1, Kingston upon Thames 11, Malden & Coombe 1 and Sutton & Cheam 8.

There appear to be no new major industrial sites near Bookham Commons which might give rise to increased local pollution. The only local industry of substance, Wildt Mellor Bromley Ltd., hosiery machine manufacturers, who have a factory with a tall chimney at Bookham Station adjoining the south side of the Commons, consider that their emissions have probably declined over the last fifteen years because their fuel consumption has not changed materially and there has been a progressive lowering of the sulphur content of their fuel oil (Briggs in litt.).

The probable cause of the increased air pollution is the substantial residential infilling which has occurred since 1956 between Leatherhead and Little Bookham, especially in Fetcham, and which is still continuing. Previously this area consisted of large single houses in substantial wooded grounds, with numerous open spaces. Many of these sites have been bought by developers who have demolished the old houses and built estates of new dwellings at much greater densities. Thus the whole area to the south of the Commons is now built-up with new houses and roads, some of which are visible from the Commons themselves. The increased housing is reflected in the population figures for the Bookham and Fetcham wards of Leatherhead Urban District which are as follows:

	1951	1971
Bookham ward	4,604	10,092
Fetcham ward	4,188	7,522
TOTAL:	8,792	17,614

The figures for 1951 are from the census on 8 April 1951 (General Register Office 1955) whilst those for 1971 are the official figures for the census on 25 April 1971, kindly provided by the Office of Population Censuses and Surveys, Titchfield, Hampshire. The figures demonstrate that the population of Bookham and Fetcham has doubled during the past twenty years. Such a substantial increase in population inevitably increases low-level emissions of sulphur dioxide, despite the fact that all the new houses are for the middle class and expensive, and use electricity, gas, oil and smokeless solid fuels, rather than coal, for heating purposes, as the lack of visible smoke from their chimneys in winter indicates. Thus the decline in the lichen flora of Bookham Commons appears to be mainly due to the substantial increase in housing to the south, and the resulting increase in sulphur dioxide concentrations. This substantiates the view of Warren Spring Laboratory (1972: 20) that "nowadays the sulphur dioxide in the air near ground level originates mainly from domestic heating and the smaller industrial plant." The decline dramatically demonstrates the damage to epiphytic lichen communities which still occurs in spite of the present clean-air policy when neighbouring human population levels show a substantial increase.

The Terricolous and Saxicolous Lichen Flora

Terricolous lichens now appear to be absent from the plains. In 1956 several lichens occurred in open communities of grass-heath on Bank's Plain (Laundon 1958: 67). Today Bank's Plain is overgrown with hawthorn scrub (see above), and the lichens have disappeared because of increased competition from higher plants. Terricolous lichens were absent from Eastern Plain in 1956 and they still appear to be absent from this part of the Commons today.

The saxicolous flora was not studied in the present survey, but from general observations there is no obvious change from the period 1953-56. The lichen flora on calcareous stone, on brick and on the acid sandstone of the railway bridges remains undimished. *Caloplaca heppiana*, *Diploschistes scruposus*, *Lecanora atra*, *L. campestris*, **Xanthoria aureola*, *X. parietina*, etc., were present in 1973 on Hundred Pound Bridge, and *Lecanora polytropa*, **Lecidea tumida*, **Trapelia coarctata* agg. and **Xanthoria aureola* occurred on the east side of Tunnel Bridge in 1972. It is well-known that corticolous lichens are much more affected by increases in air pollution than are saxicolous species, so it is not surprising that the lichen flora on stone shows no pollution damage.

* New records for Bookham Commons.

I thank Mr P. W. James and Mr R. Ross for their comments on the manuscript, Dr F. Rose for kindly placing his records at my disposal, and Mr E. B. Briggs of Shell-Mex and B.P. Ltd. for useful discussions.

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Survey of *Ruscus aculeatus* on Bookham Common: The First Two Years

by Ella M. Hillman and Audrey Warren

Summary

Information on the sub-dioecious character of *Ruscus aculeatus* L. and on its flowering period from various sources is summarised.

Investigation into the population of the plant on Bookham Common suggests that it is largely dioecious there, and that fruiting is rare but best on female plants when male ones are near. Pollinating agents are unknown. It often flowers in winter and again in spring.

The size, height and pattern of clumps and the composition of some colonies is discussed. Propagation entirely by vegetative means is thought to be unlikely.

Some aspects of the ecology of the plant are mentioned.

Introduction

An account of *Ruscus aculeatus* L. on Bookham Common as the objective of a survey was suggested in the early 1950s by the late C. P. Castell. He had begun to record the whereabouts of clumps of this plant, using mostly three-figure references on the grid he prepared for the map used by the Bookham Common Survey. These references locate a square of approximately 0·45 hectares (1·1 acres) in which a plant or plants are found. A map of the distribution from his records, mostly 1941-1950, has been made for comparison (Fig. 1), and it shows that the areas in which *R. aculeatus* is most plentiful today are those from which he obtained most of his records. This is referred to again below when discussing the colonies.

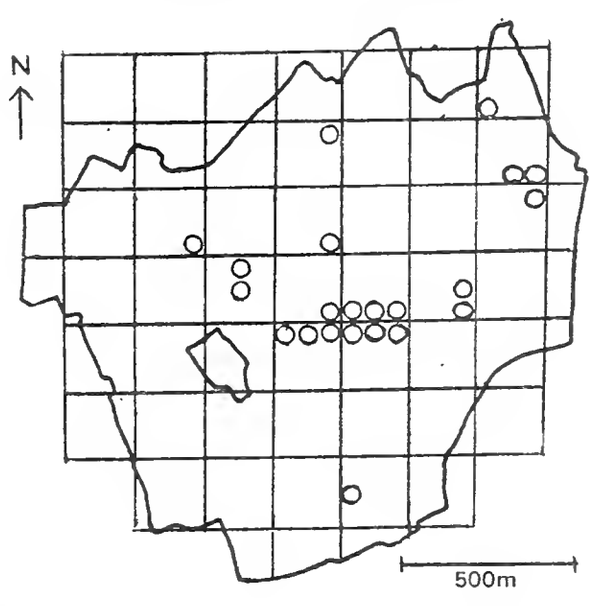

Fig. 1. Map of the distribution of *Ruscus aculeatus* on Bookham Common, 1941-1950, from the records of C. P. Castell. Each grid square is divided into 3 x 3 smaller squares of area 0·45 ha (1·1 acres). The symbol O denotes the position of a square from which there are one or more records. (E.M.H.)

The plant has several features unusual in the British flora. It is well known that the apparent 'leaves' are really modified branches or cladodes, that the plant belongs to the family Liliaceae, to the other members of which it bears little superficial resemblance, and it is the only shrub in the British flora which is a monocotyledon. Its English names are butcher's broom, said to be from the fact that butchers used bunches of the stems to sweep their blocks (Chambers Dictionary et al.), and knee-holly (or knee-holm) (Nuttall's Dictionary), presumably because it resembles holly in its prickly and evergreen character, in colour, and in habitat, but grows only "knee-high". (The Oxford Dictionary supports the Anglo-Saxon derivation, which would favour this explanation, rather than that of Prior (1879) based on Latin.) It should be noted here that the true leaves, which are minute, are scarious; it is the cladodes which are evergreen.

The stimulus to the present survey was given when, in studying the spread of trees and shrubs on the Common, it was observed that *Ruscus aculeatus* was recorded from 16 of the 20 vegetation areas into which the Common had been divided by the survey in 1953, and from 17 of them in 1968-1971 (Hillman 1972). All these contain woodland, and the only areas from which it is absent are those of scrub and grassland. It is remarkable that a shrub which is believed to be dioecious, which flowers at a time when there appear to be few pollinating insects, whose flowers are tiny and whose clumps are sufficiently far apart as a rule to make wind pollination or purely vegetative propagation seem unlikely, and which produces very little fruit, should be able to keep pace with the woodland in its extension of range. Curiosity as to its method of propagation was aroused and the survey was begun.

A condition laid down was that this was to be done with as little disturbance to the plants as possible. Flowers were to be examined on the plant and not collected, and this proved very uncomfortable. Occasionally broken stems were found with buds or flowers and these were taken away for investigation as were berries or flowers which fell off in the handling. In the interests of conservation no digging up took place. As a result some questions inevitably have had to remain unanswered. Most of the field work, mapping and recording, has been done by Mrs A. Warren with some assistance from Miss J. M. Stoddart and Miss E. M. Hillman.

Preliminary Investigation into Accounts of the Plant

1. Sex. We began with the intention of recording the positions of male and female clumps, for it is stated (Clapham, Tutin & Warburg 1962) that the plant is dioecious. Hutchinson (1955), however, states that the plant bears bisexual as well as unisexual flowers. We here explain some of the terms used for the benefit of those not familiar with them:

Clone. Plants derived by vegetative propagation from a single plant and therefore having the same genetic make-up.

Hermaphrodite. Bisexual, having stamens (male organs) and pistils (female organs) in the same flower.

Staminate. Furnished with or producing stamens. Of some flowers: having stamens but no pistil (Shorter Oxford Dictionary). Hence the set of staminate flowers properly includes three sub-sets, (a) hermaphrodite flowers, (b) those having stamens and no pistil (male) and (c) those having stamens and vestigial (undeveloped) female parts (male, but capable of sex change). In usage, the word 'staminate' is applied, generally, to sub-sets (b) and (c), for which the above definition allows.

Pistillate. Having a pistil. The same remarks apply mutatis mutandis to the use of this word.

These last five terms are applied to flowers or to the plants bearing them:

Dioecious. Having male and female flowers on different plants.

Sub-dioecious. Usually dioecious but not always so.

Monoecious. Having male and female flowers on the same plant.

Andromonoecious. Having male and hermaphrodite flowers on the same plant.

Gynomonoecious. Having female and hermaphrodite flowers on the same plant.

Clearly the terms dioecious and monoecious applied to the whole species are contradictory, and both have been applied to *Ruscus aculeatus*, but it is possible for a sub-dioecious species to have monoecious etc. clones within it.

It is probable that more is known concerning the sexuality of *Ruscus aculeatus* than has appeared in print. We summarise here what information we found, and are indebted to Dr P. Yeo of the University Botanic Garden, Cambridge, for supplying the reference for note (d), and for his own observation (e) (in litt.), as well as for the information that the three types of flower in *R. aculeatus* can be distinguished, when fully developed, with a hand lens, and for very helpful diagrams which enabled us to do this (Fig. 2).

(a) Stems bearing male flowers and others bearing female flowers can arise from the same rootstock (Scott & Stokoe 1944).

(b) Male buds (under microscopic examination) and ripe fruits were found on the same branch (M'Nab 1870).

(c) "Hildebrand describes the plant as monoecious" (Knuth 1909).

(d) A pistillate plant which had been under observation for twelve years without fruiting then produced one berry, there being no other plants in the neighbourhood. The observer, Watson (1921)

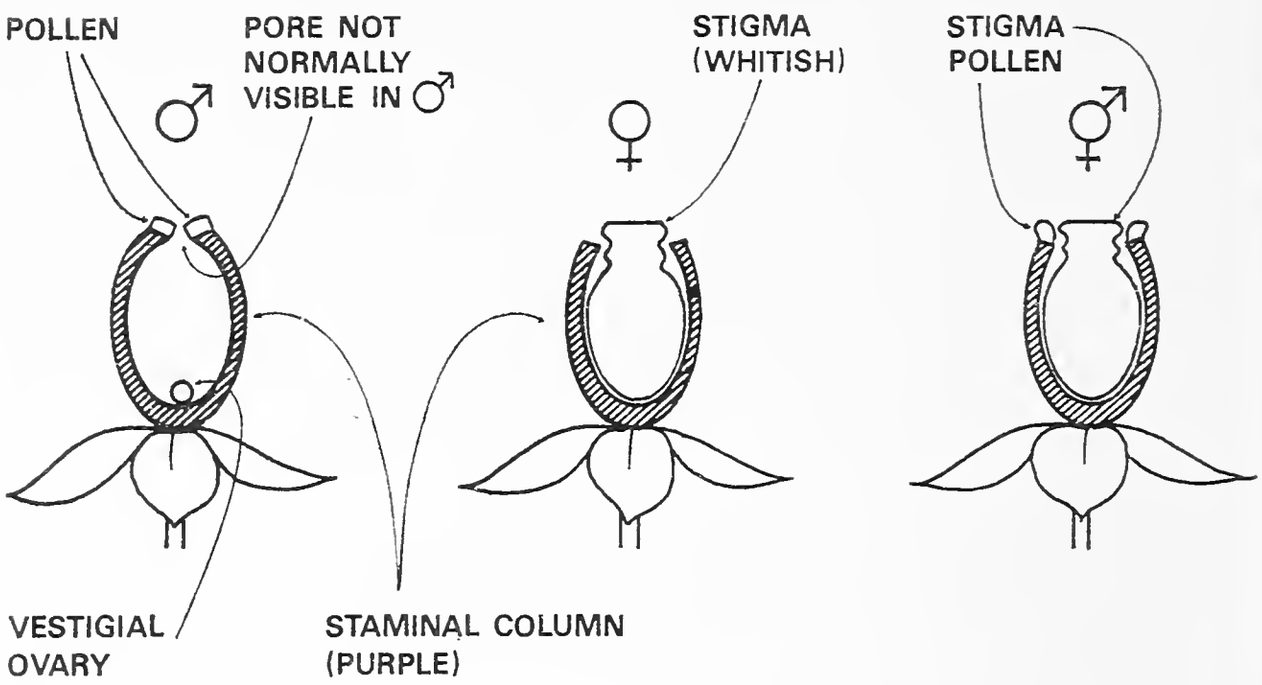

FIG. 2. Longitudinal section through axis of flowers of *Ruscus aculeatus* held vertically. Enlarged. (E.M.H. after Dr P. Yeo).

suggests that stamens had been formed on the pistillate plant, no doubt thinking this more probable than the possibility of pollen grains from afar reaching such a tiny target even once in twelve years. He remarks that near Dartmouth the pistillate plants were full of berries but staminate plants were always present. "The rarity of fruit on pistillate plants when staminate ones are absent shows that this plant is normally dioecious, and that its sub-dioecious character is very slight".

(e) Dr P. Yeo states that exceptions occur to the essentially dioecious character of *Ruscus aculeatus* and that fruits have been borne on shoots that produce male flowers. When this was observed a plant was taken into the greenhouse for observation and it was found to produce male flowers most of the winter but a flush of hermaphrodite flowers in late spring. From these fruit developed very rapidly, so that the hermaphrodite flowers could easily be missed. It was a very fertile clone, short and stout, sometimes grown in gardens.

(f) S. Ross-Craig (1972) has drawn a plant with male flowers and the previous year's fruits on the same branch.

Summing up, then, *Ruscus aculeatus* is sub-dioecious, cases of andromonoecious clones are substantiated, one of a gynomonoecious or monoecious plant suspected, and note (c) holds a suggestion that continental clones may show more of this monoecious character.

2. Flowering Period. This is stated in Clapham, Tutin & Warburg (1962) to be January to April, but this statement in the botanical text-books of the time was questioned as long ago as 1869 (Bennett),

and Reid (1892) often found flowers out in November. These flowers seldom, if ever, produced fruit, the November ripening berries being produced by March flowers.

3. Pollination. The only statement in the *Handbook of Flower Pollination* (Knuth 1909) is the quotation from Hildebrand given in note (c) above. Bennett (1869) says that a number of winter-flowering plants are self-pollinating, and lists *Ruscus aculeatus* as a winter-flowering plant.

Investigations at Bookham Common

These have been concerned with the three topics mentioned above and others. Altogether 80 clumps have been located and mapped in an area of approx. 24 hectares (60 acres) searched. Of these 55 have been numbered and labelled.

1. Sex. Where flowers were found on a clump these were all of one sex, with the exception of one or two possibly hermaphrodite flowers. It seems reasonable to suppose that the stems from any one clump are all from one rootstock and form a clone. 43 of the 55 numbered ones have been sexed and 23 of the 25 unnumbered ones, ignoring for the moment the possibilities of hermaphrodite developments. Those plants on which female flowers are found are shown as F, those on which berries but no flowers have been recorded as F(b), and males as M. The numbers are:

M 23 F 33 F(b) 10 Undetermined 14

Thus on the assumption that the plant is truly dioecious at Bookham, the ratio of male to female clumps is about 1 : 2. It will be seen that 56 clumps have been recorded as having flowers, sometimes in plenty, and these have received about 200 visits in all, during which not more than two possible, but doubtful, cases of the development of hermaphrodite flowers have been observed in the field. One was from a plant not sexed at the time, but in December 1972 this clump was sadly reduced by human predation. (Some stems were found lying by the plant, but may well have belonged to another clump which had been robbed. They were removed and put into water indoors on 11 December. One bore staminate flowers on 31 December, and one flower was still on its cladode on 8 February 1973).

2. Flowering Period. Flowers have been recorded in every month from September to June as follows. The Table shows the number of clumps on which flowers were seen in each month. Too much reliance should not be placed on these figures as they are biased by the number and activity of observers, but to avoid other bias they are based on two sets of figures for each month using the period January 1971—December 1972 inclusive.

September	1	February	1
October	11	March	8
November	19	April	14
December	17	May	8
January	14	June	1

These figures suggest a double flowering period for the Bookham population, perhaps also for individual plants, as 14 had flowers open in spring (March-May) and also in winter.

3. Fructfication. On the 80 clumps examined, a total of 155 berries have been found in the period October 1970 to December 1972. These came from 31 clumps of which 21 also bore female flowers; on the remaining 10 no flowers had been recorded. One red berry had no stone, so that not all of the berries were necessarily fertile. Although it is certain that by no means all the berries produced will have been found, it is clear that the amount of fruit, for which bushes were carefully searched, is very small, when countable in this way.

4. Pollination. Up to the present we have been unable to find direct evidence of any pollinating agent. In late March 1971 many moth-flies Psychodidae were seen alighting on the branches but not on the flowers. They had probably just emerged from the leaf-litter below. These flies have been observed on subsequent occasions round a clump. Bushes are often covered with the webs of small spiders, for which a bush is not only a convenient housing site but must afford a good source of food. So far no small flying insects have been collected or identified other than the moth-flies, and more work is needed here. As flowers are often plentiful and pollen likewise, wind pollination may be possible, but seems unlikely because of the size of the target and the distance between clumps. Nevertheless a consideration of the position of the best fruiting clones in relation to male clones suggests cross-pollination by some agent, as does the appearance of variation in the population.

5. Size and pattern of clumps. A clump is considered to be a plant from a single rootstock, though there may be one or two exceptions to this. Vegetative growth of a clump takes place by means of creeping rhizomes. Rather crude estimates have been made of the area of 34 of the clumps, and are grouped as follows:

Area (sq. metres)	No. of clumps
0 — 0·5	15
0·5 — 1·0	6
1·0 — 1·5	3
1·5 — 5·0	4
5·0 —10·0	4
10·0 —15·0	2, the largest being nearly 15·0 m^2.

The largest clumps are not very compact, some of the inner stems having died as growth on the perimeter has taken place. If this process of spreading and separating is continued over many years the result could be colonies forming a clone. We have yet to discover and measure the largest group of bushes all of one sex of which this might be true, but we have collected some facts about the six main clusters or colonies of bushes (Fig. 3), which have been mapped. The average area is roughly estimated as 2 hectares (5 acres) each. The composition of the six is as follows:

	Colony	M	F+F(b)	Undetermined	Fruiting
Central Wood South	A	5	2	2	2 (1*)
Central Wood	B	4	12	—	8 (2*)
South-east Wood	C	3	4	—	4 (1*)
Central Wood East	D	2	5	1	3
Hill House Wood	E	1	5	4	4 (1*)
Eastern Wood	F	1	5	3	3

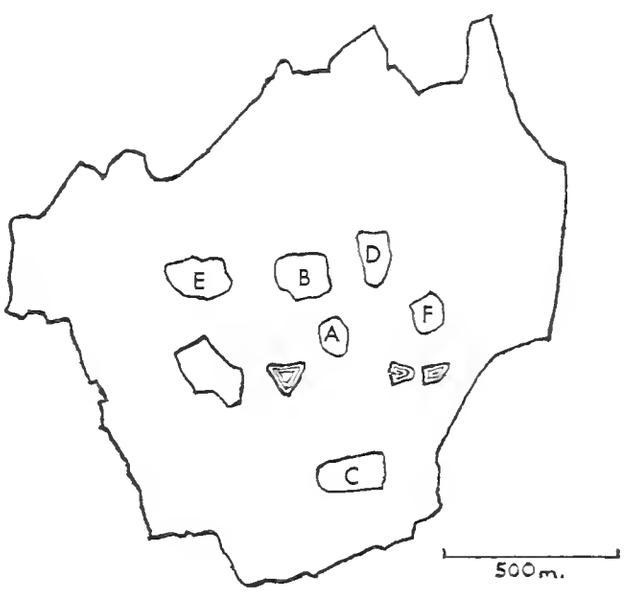

FIG. 3. Map of the six main colonies into which 59 of the 80 mapped clumps of *Ruscus aculeatus* are arranged, 1970-1972. Others in the northern part of the Common are not within the area surveyed and are not shown on this map. (A.W.)

A preponderance of one sex, bearing in mind that the overall ratio of male to female (F+F(b)) is 1 : 2, is shown clearly only in the first two, the number of unknown sex making the rest inconclusive. So far not very much weight is lent to the idea that a colony of this size has arisen vegetatively from a single bush. Against that idea also is our observation that the rate of growth of a clump is very slow, though we must admit that we do not know how far a rhizome can grow horizontally before sending up a shoot. Below are the results of counting new shoots on 30 plants in the period October 1970—December 1972.

No. of new shoots on clump	No. of times recorded
1	12
2	10
3	8
4	2
5—10	3
16	1
several	1
many	1

A number of dead shoots are found whose numbers are roughly comparable with the above. Thus the growth of each clump is usually only a few cm^2 per annum. Colonies covering approximately 2 hectares (5 acres) are now six in number in the survey area but in 1950 there appears to have been only one, and a second of about half this size which cannot now be traced. In 1953 the plant is described as "found throughout the woodland but always in very small quantities" (Jones 1954). At the observed rate of growth, on average say 30 cm^2 per annum, it does not seem possible for a clump from a single root-stock to develop into a colony extending over 2 hectares in 19 years by this means, and as each colony contains, usually, about nine bushes, it is clear that they are well spaced, and creeping underground stems would have to travel a very long way, if all reproduction is purely vegetative. Certain smaller groups of bushes all of one sex, one in a ring, the other in a line, may form a clone, and should receive special attention in the next phase of study. In each of the six named colonies, though one sex may sometimes predominate, both are present, and it seems likely that a certain amount of seed production, though small, the seeds being in some cases likely to fall and germinate near to the parent plants, may have augmented what vegetative reproduction can do in the way of generating colonies. The six best fruiting bushes, all of which have borne female flowers, are recorded as having the following numbers of berries in the period October 1970—December 1972: 22, 18, 15, 14, 13, 11, the next highest number being 6. The first of these is not within a colony, but a male plant is recorded near it. The other five are shown with an asterisk in the list of fruiting bushes in the colonies. It will be seen that the proportion of fruiting bushes and particularly of the more productive ones, in relation to the number of females tends to be greater where more male bushes are present within the colony. The map also shows that the bushes with most fruit are quite close to male ones except in the Hill House Wood colony where vandalism has made the determination of the sex of the nearest bushes impossible. As the total number of females here includes the F(b) class, i.e. the 10 on which we have not yet recorded flowers, the possibility of the production of berries from hermaphrodite flowers must not be discarded, but on the whole some cross-pollination seems likely from these figures, although the means

remains unknown. It has also been noticed that some plants have much narrower cladodes than the majority, but probably not narrow enough to qualify for the var. *angustifolius* of horticulture (Yeo 1968), while in a few clumps a very thick stem has arisen bearing cladodes twice as long and more than twice as broad as the norm for the Common. The cladode length is given as 1—4 cm (Clapham, Tutin & Warburg 1962) showing that cladode size is variable. Nevertheless these stems are of peculiar appearance. We cannot tell without digging up the plant whether they are freak stems on an otherwise normal stock, or a new plant growing among scattered stems of the old one; if the latter, they may belong to the garden variety var. *rotundifolius*, which may be appearing as a natural mutant or a hybrid between varieties in the Bookham population, and would lend weight to the view that some propagation is by means of cross-pollination. More work should be done in the study of these variants in a natural or naturalised population, and *Ruscus aculeatus* at Bookham offers, probably, the best opportunity to be found near London for such a study concerning this plant.

In 28 of the clumps whose area was estimated, the height of the tallest shoot was recorded as the height of the plant. This in general exceeded the height of the majority of stems by only a small fraction, usually much less than $1\frac{1}{4}$ times as much. Only three clumps showed a height of 33 cm or less and these were much the smallest in area, so can be regarded as not fully developed. Of the rest the heights are not correlated with area, and range from 45—117 cm, with an average of 74 cm, half of them lying in the range 64—84 cm. Nine are taller than 80 cm, the maximum length of stem given by Clapham Tutin & Warburg (1962).

Some clumps have been found in the form of a hollow ring round a tree, at distances from it between 0 and 1 metre approx. In one case where a hollow ring was found without a tree being visible, a close look revealed a hidden stump of a felled tree in the centre. It seems most likely that this formation is caused by the growth of a young tree within a clump, the stems of *Ruscus aculeatus* near it being killed by the growth of the tree. So far observations have not revealed any particular orientation of clumps, nor any preference for any particular tree as neighbour. As the canopy of the oak-wood is closed over the survey area, with a good shrub layer, the plants of *Ruscus* are never more than a few metres from the nearest tree and indeed are often found in contact with trees.

6. Ecology. The fact that the habitat of *Ruscus aculeatus* is woodland and never grassland is possibly due to young shoots being vulnerable to frost (Dymes 1921). The sheltering effect of an oak-wood has been observed on bracken (*Pteridium aquilinum*) whose new shoots have been killed by frost in the grassland of the plains of Bookham Common while those in the oak-wood survive. It may

also have been difficult for seeds to germinate of the often waterlogged soil of the plains.

Some cladodes have been found with small holes as though eaten by a leaf miner, and the prickly tips are also eaten—in one case a mammal was thought to be responsible. Probably the main check to this plant is competition and human predation. It seems to be absent from areas of dense bramble (*Rubus* sp.) ground cover and from bracken areas; it will grow alongside holly (*Ilex aquifolium*) and intermingled with it for a considerable period, but is then usually straggly and eventually it seems probable that holly with its faster and very much taller growth will exclude *Ruscus aculeatus*. Human predation is more serious. In December 1972 several of our numbered clumps had been cut down, leaving for instance only three stems out of 23 on one, and the number tags had gone too. Possibly the spread of the plant since 1953 is attributable to the lack of such predation when in the earlier part of this period the Common was less accessible than now, being much muddier, and the failure to spread earlier than 1953 may have been due to predations by "gipsies" who camped in the heart of the woods in December about the year 1950.

Conclusion

The questions which aroused our curiosity remain unanswered, but we have found some lines of inquiry along which to proceed and we shall concentrate on some of these in the next stage. We hope that others will be interested in this account and will join in the hunt for facts. There is work for people with varied interests, including entomologists. A whole colony or colonies in the northern parts of the woods await exploration. The stage has been reached when we would feel justified in a little experimentation, but this is limited by the fact that the survey team meets only once a month for this work. Mr T. S. Worthington and Mr J. Kirby have made some interesting slides of the flowers. They hope to publish elsewhere some findings on their anatomy.

We should like to thank all those whose names are mentioned in the text for their help and interest, and other members of the survey who have given us information from time to time.

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The Incidence of Coccidia in the Rabbit on Bookham Commons

by M. Towns

Summary

Rabbit faecal pellets were examined for the presence of oocysts of parasitic coccidia. Three species, *Eimeria media*, *E. perforans*, and *E. piriformis*, were found to be widespread in the rabbits at Bookham Commons.

The coccidia are a group of protozoan parasites (see Baker 1969) which infect the intestinal tract and some associated organs of all classes of vertebrates. Infection is initiated when the host species swallows an infective oocyst, an egg-like stage of the parasite's life cycle. Once swallowed, the protective wall of the oocyst is dissolved by the action of the host's digestive juices and the sporozoites within the oocyst are released. The sporozoites then invade the epithelial cells lining the alimentary tract. In general, each species of parasite is confined to a specific region of the intestine. After entering a cell the sporozoite undergoes asexual multiplication, until eventually the cell ruptures, releasing large numbers of merozoites which in turn invade other cells. This type of proliferation can be very rapid, causing bloody diarrhoea and emaciation which may terminate with the death of the animal. Subsequent sexual conjugation then occurs which results in the formation of the oocysts. These are liberated into the lumen of the intestine and pass out of the animal's body with the faeces. Infective oocysts are able to survive for long periods.

The severity of an infection varies among the species of coccidia and even among individuals of the same host species. In the rabbit, *Oryctolagus cuniculus* (L.), the young animal is most seriously affected by these parasites, which can contribute heavily to early post-weaning mortality. If a rabbit survives an infection by invading coccidia it will develop an immunity to that parasite, but nevertheless a low level of parasite activity may continue and oocysts will still be shed in the faeces. The immunity gained is species specific, and cross-immunity does not occur. Identification of the various species of coccidia depends on the examination of their oocysts. These are microscopic in size and have characteristic external and internal features which assist in differentiation. Since oocysts are passed out of the animal's body in the faeces they are easily collected and may be separated and concentrated for culture and identification using the technique outlined below.

A sample of faecal material is suspended in a saturated sugar solution and filtered through a coarse mesh sieve to remove excess debris. The filtrate is then centrifuged at 1500 r.p.m. for three minutes. The oocysts float on the surface of the filtrate and can be pipetted off into a two per cent. solution of potassium dichromate, where they are allowed to sporulate. They are then ready for examination.

Samples were taken throughout 1972 and were collected from a wide area of Bookham Commons, but principally from the warrens described by Towns (1972). Every effort was made to minimise the risk of taking faecal pellets from the same rabbits by "scattering" sample areas, and by resampling areas only after some time had elapsed. A total of thirty-six samples were taken and thirty-four of them yielded oocysts. Out of a possible eight species of coccidia listed by the Ministry of Agriculture, Fisheries and Food (1971) as infecting the domestic rabbit, six species were found to be present in the wild rabbit at Bookham (Table 1).

Species	Incidence
**Eimeria media* Kessel	31
**Eimeria piriformis* Kotlán and Pospesch	30
Eimeria perforans (Leuckart)	29
**Eimeria irresidua* Kessel and Jankiewicz	16
**Eimeria magna* Pérard	6
Eimeria stiedae (Lindemann)	1

TABLE 1. Coccidia from rabbit faecal pellets at Bookham Commons, showing the number of samples in which each species was found. The species marked with an asterisk (*) are new additions to the British checklist.

Of the six species of coccidia, *Eimeria irresidua*, *E. magna* and *E. stiedae* are regarded as being the most pathogenic, and the oocysts of these species were found in fewer of the samples than were those of *E. media*, *E. piriformis*, and *E. perforans*. It is possible that the lower incidence of these highly pathogenic species is a result of their virulence which would tend to eliminate their hosts before an immunity could be acquired. The early death of the host would reduce the number of oocysts the parasite is able to produce for infecting other individuals in the host population. It can be seen therefore that successful parasitism depends upon minimal damage sustained by the host. In the domestic rabbit *E. perforans* is regarded as being the least pathogenic and therefore the most successful of the rabbit coccidia. However in the wild rabbit population at Bookham, *E. media* and *E. piriformis* appear to be of equally low pathogenicity and therefore equally successful. Soulsby (1969) quotes *E. stiedae*, *E. irresidua* and *E. magna* as being the most important species among rabbits in warren habitats.

Eimeria stiedae is a parasite which invades the liver and oocysts appear less frequently in the faeces. This may be the reason for the low count recorded for this species. However, *E. stiedae* is the most virulent of the rabbit coccidia and in the domestic rabbit has almost a 100 per cent. mortality. It is interesting to note that the rabbit infected with *E. stiedae* was also heavily infected with all of the other species of coccidia recorded above and was also suffering from myxomatosis. This was the only faecal sample that was collected

from a known animal and illustrates how a debilitating disease, in this case myxomatosis, might reduce host resistance, and allow enormous parasitic infections to develop.

Infection with coccidia in the rabbit is not usually by a single species and multiple infection is generally the rule, as is shown by Table 2. The two most frequently encountered combinations were those involving the three species *Eimeria media*, *E. piriformis* and *E. perforans*, and the four species *E. media*, *E. piriformis*, *E. perforans* and *E. irresidua* with occurrences of 33 per cent. and 27 per cent. respectively. *E. media*, *E. piriformis* and *E. perforans* occurred together in 77 per cent. of all the samples.

E. media	x	x		x	x		x	x	x	x
E. piriformis		x	x	x		x	x	x	x	x
E. perforans		x	x		x		x	x	x	x
E. irresidua		x				x		x		x
E. magna		x							x	x
E. stiedae		x								
Total No. infected	2	1	1	1	1	1	12	10	2	3

TABLE 2. The extent of multiple infection showing the number of faecal pellet samples containing combinations of species of coccidia.

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Preliminary Observations on the Invertebrate Fauna of Bracken Areas at Bookham Commons

by A. E. Le Gros and M. Towns

After the withdrawal of cattle from the Commons, large areas of Eastern Plain rapidly became colonised and dominated by bracken (*Pteridium aquilinum*). The National Trust Management Committee decided to clear some of these areas with the aid of a mechanical rotary cutter. Operations began in 1969 and the bracken was razed several times a year in order to weaken and eventually eradicate it. One of these cleared areas on the northern side of the Plain close to gunpit A was considered to be suitable to study the changes in the active arachnid component after the destruction of what was thought to be a "sterile" habitat, and pitfall traps were placed there in February 1971. Later it was proposed to carry out comparative studies of the ground fauna of pure bracken stands elsewhere on the Plain and also to study the fauna of the growing bracken.

In February 1971 the selected area had a ground cover consisting of 50 per cent. bracken, aspen and oak litter and 50 per cent. vegetational cover in the form of grass tussocks mainly of *Holcus lanatus* (Yorkshire fog) and *Agrostis canina* (brown bent). Young stems of *Populus tremula* (aspen) and *Betula pendula* (birch) were common. Eleven pit-fall traps (2lb jars charged with 5 per cent. formalin) were set in a line at one-metre intervals. They were emptied fortnightly and the trapped specimens were transferred to 80 per cent. alcohol. Although the traps were placed close to a path only one catch was lost through vandalism by children. To distinguish the area from others under observation it was called a litter area. Unless otherwise mentioned the present paper is concerned with the invertebrates obtained from the litter area in the twelve months February 1971—January 1972.

There has been a general impression in the past of the "sterility" of bracken cover. Birds do not appear to resort to it for food. Bristowe (1939) considered it to be unfruitful for spiders. Parmenter (1950), however, thought that the bracken canopy provided a micro-habitat with a stable microclimate that attracted a characteristic dipterous population, and Greenslade (1964, 1965) and Evans (1971) have found carabid beetles quite common in bracken in and adjacent to woodland. The large number of predators trapped in the litter area, many of which must have belonged to the pure bracken fauna, indicates prey to be plentiful.

Some notes have been made of the activity of some spiders and harvestmen, but comment on most of the other invertebrates trapped will be kept for later when some comparisons with pure bracken fauna may be made. In the lists species believed to be new records for the Commons are denoted by an asterisk (*).

Arachnida

Araneae. The dominant spiders were the lycosid *Pardosa pullata* (Clerck) and the tetragnathid *Pachygnatha degeeri* Sund.

Lycosidae.

	Adults		Total
	First recorded	Last recorded	
Pardosa pullata (Clerck)	4.5.71	17.10.71	567
Trochosa terricola (Thor.)	18.4.71	25.11.71	83
Pardosa prativaga (L.K.)	25.4.71	25. 7.71	65
Alopecosa pulverulenta (Clerck)	16.5.71	16. 5.71	11
Pardosa amentata (Clerck)	16.5.71	16. 5.71	7
Pardosa nigriceps (Thor.)	16.5.71	16. 5.71	5
Pardosa lugubris (Walck.)	4.5.71	4. 5.71	2
Immature	——— year ———		221

The first three species appear to be the more characteristic of the area. The others, which were found on one day only, are wanderers from adjacent areas; *Pardosa lugubris* from Hollow Wood and *Alopecosa pulverulenta*, *Pardosa amentata* and *P. nigriceps* from the open plain. *P. prativaga* is often found in association with *P. pullata* and the two species may interbreed. The appearance of adult *P. pullata* (Fig. 1) was quite abrupt. The marked decline in July was probably due to the dying off of the males after mating was completed. Females were trailing egg cocoons from early May until mid September. It is a spider of more or less open plain—*Festuca* grassland (Duffey 1962) which it dominated.

Immature lycosids (Fig. 2), the majority of which were almost certainly *P. pullata*, were active throughout the year. There was a steady rise in numbers from March to July, with the numbers for June and July boosted by numbers of juveniles.

Tetragnathidae. *Pachygnatha degeeri* Sund. and *P. clercki* Sund. were the only tetragnathids taken. *P. clercki* appeared in small numbers throughout the year and resulted in a total of 34 specimens. *P. degeeri* (total 367 specimens) appears to be a most successful species. Said to be a webspinner in its younger stages, as an adult it competes with other ground-hunting spiders in many kinds of habitat. Immature specimens were rarely taken because as webspinners they are less likely to wander. A comparison may be made with the linyphiids whose adult males were trapped more often than the web-spinning females. Fig. 3 shows a double peak for *P. degeeri* activity, one for the months May-July and the other for October, although adults were active throughout the year. Most previous surveys have

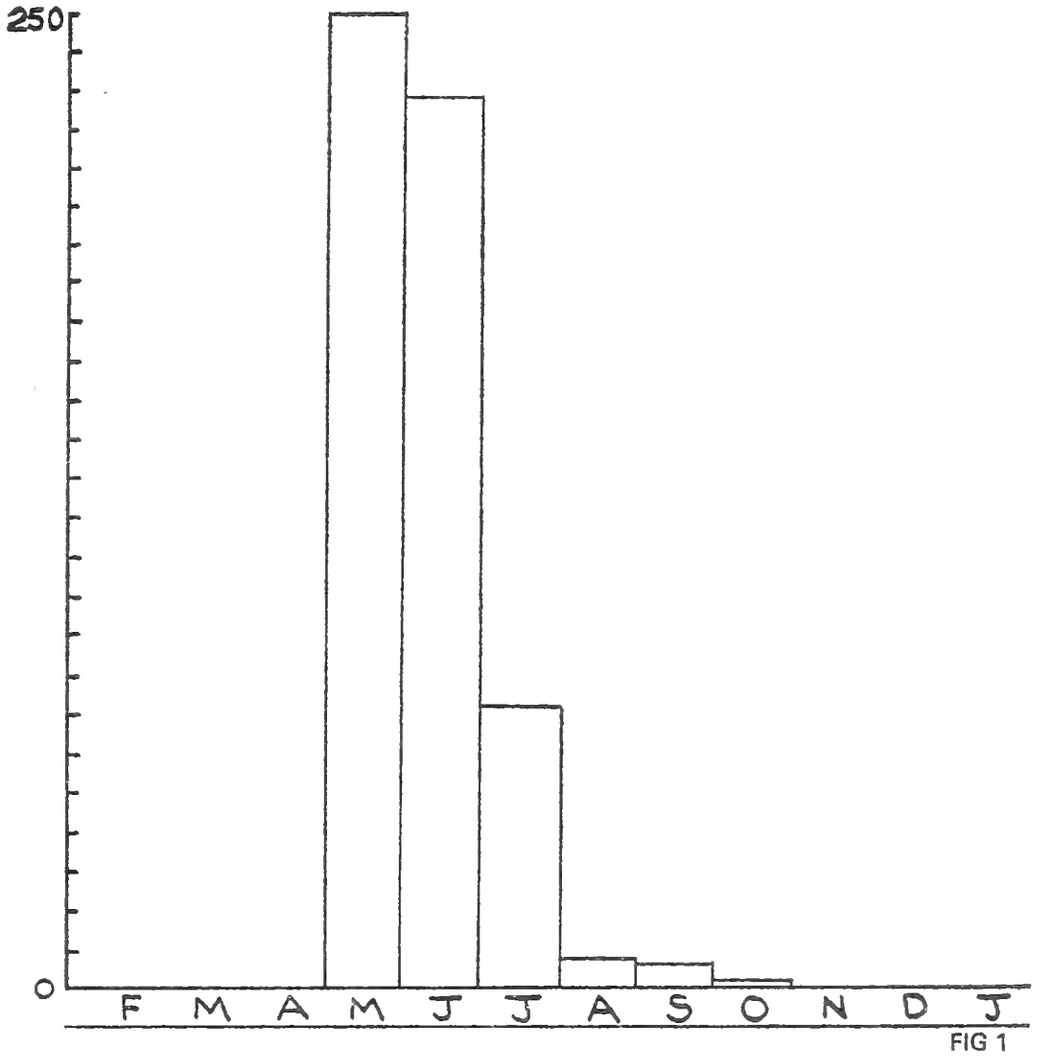

FIG. 1. The numbers of adult *Pardosa pullata* trapped each month; February 1971–January 1972.

FIG. 2. The numbers of immature Lycosidae trapped each month.

FIG. 3. The numbers of *Pachygnatha degeeri* trapped each month.

shown a single long activity period, with a single or no peak (Merrett 1968), but Williams (1962) noted a double peak for May and September.

Other spiders have been taken but as there are several collections still to be examined only a list of species will be presented here.

Gnaphosidae	*Drassodes lapidosus* (Walck.)
Clubionidae	*Clubiona terrestris* West.
	Agroeca brunnea (Bl.)
Thomisidae	*Xysticus cristatus* (Clerck)
	X. erraticus (Bl.)
Pisauridae	*Pisaura mirabilis* (Clerck)
Agelenidae	*Coelotes terrestris* (Wider)
	Antistea elegans (Bl.)
Linyphiidae	*Walckenaera acuminata* Bl.
	W. melanocephala O.P.-C.
	Oedothorax fuscus (Bl.)
	Savignia frontata Bl.
	Araeoncus humilis (Bl.)
	Diplocephalus cristatus (Bl.)
	Erigone dentipalpis (Wider)
	Cnephalocotes obscurus (Bl.)
	Porrhomma sp.
	Lepthyphantes tenuis (Bl.)

Opiliones. Nine species of harvestmen were taken in the traps, all in small numbers in the "litter" area.

	Month												
	F	M	A	M	J	J	A	S	O	N	D	J	Total
Platybunus triangularis (Herbst)	–	–	1	1	3	–	2	–	–	–	–	1	8
Lacinius ephippiatus (C.L.K.)	–	–	–	–	–	1	1	1	–	–	–	–	3
Phalangium opilio L.	–	–	–	–	–	1	–	–	–	–	–	–	1
Leiobunum rotundum (Latr.)	–	–	–	–	–	–	3	3	–	–	–	–	6
Mitopus morio Fabr.	–	–	–	–	–	–	2	–	–	–	–	–	2
Leiobunum blackwalli Meade	–	–	–	–	–	–	1	–	1	–	–	–	2
**Oligolophus meadi* (O.P.-C.)	–	–	–	–	–	–	3	1	–	–	–	–	4
O. agrestis (Meade)	–	–	–	–	–	–	–	–	1	2	1	1	5
Nemastoma bimaculatum (Fabr.)	–	–	–	–	–	–	–	–	–	–	3	2	5
Total individuals	–	–	1	1	3	2	12	5	2	2	4	4	36
Total species	–	–	1	1	1	2	6	3	2	1	2	3	9

A total of 36 individuals was taken throughout the whole year, the greatest number being captured in August, when six of the nine species were active. It is interesting to compare these figures with three collections made in a nearby bracken area in January 1972 before that too was razed:

	1 Jan.	13 Jan.	29 Jan.	Total
Nemastoma bimaculatum (Fabr.)	13	8	5	26
Platybunus triangularis (Herbst)	2	6	5	13
Oligolophus agrestis (Meade)	3	1	—	4
Mitopus morio Fabr.	1	—	1	2
Total	19	15	11	45

This bracken area produced a total of 45 individuals in six weeks compared with a total of 36 for the whole year in the litter area. It would seem that the immediate result for the harvestmen of the gradual clearance policy is the reduction in numbers of at least some of the species.

Acari. **Pergamasus crassipes* (L.) (Parasitidae) (determined by Mr K. H. Hyatt), a typical predatory mite of litter, was taken in small numbers throughout the year. Another predatory mite **Erythraeus phalangoides* (De Geer) (Erythraeidae) (determined by Mr D. Macfarlane), which is parasitic in its larval stages on harvestmen, was taken in large numbers in late July and early August. Very few oribatid mites were trapped.

Insecta

Collembola. Seven species of springtails were named by Mr P. N. Lawrence from the earlier collection. Some members of the family Sminthuridae were taken in the autumn and await determination.

Hypogastruridae	**Hypogastrura denticulata* (Bagnall)
Isotomidae	**Isotoma viridis* (Bourlet)
Entomobryidae	**Lepidocyrtus* sp.
	**Orchesella cincta* (L.)
	**O. villosa* (Geoffroy)
Tomoceridae	**Tomocerus longicornis* (Müller)
	**T. minor* (Lubbock)

H. denticulata was particularly abundant during the period February-May when it outnumbered all other species by the ratio of 50: 1. On three occasions collections of these springtails exceeded a thousand individuals. On 20 February 1971 there were 1000 plus, on 21 March 1971 there were *c.* 1500, and on 25 April 1971 they numbered *c.* 1200. The appearance of *H. denticulata* in the traps in such high numbers seemed to be linked with periods of very heavy rainfall. When rainfall was heavy enough to cause flooding of the top-soil and pore spaces of the soil these springtails are driven to migrate to the surface. Mr Lawrence states that this species has been found forming rafts on rainwater puddles and garden ponds.

Orthoptera. The only grasshopper taken was *Tetrix undulata* (Sowerby) (Tetrigidae). The species was most active from May to August.

Dermaptera. Occasional adult specimens of the common earwig *Forficula auricularia* L. (Forficulidae) were found in the traps, with juveniles appearing from May to July.

Dictyoptera. On 5 September 1971 a nymph of the field cockroach *Ectobius pallidus* (Olivier) was taken, and on 19 September one nymph and an adult.

Hymenoptera-Aculeata. Formicidae. *Myrmica rubra* (L.) and *Lasius niger* (L.). The former is the dominant ant of this part of Eastern Plain. *L. niger* which competes with it elsewhere on the Plain was represented in the traps by a single de-alated queen.

Vespidae. *Vespula germanica* (L.)

Apidae. *Bombus lucorum* (L.), *B. pratorum* (L.) and *B. terrestris* (L.). These were all queens trapped shortly after emergence from hibernation in April when they were seeking nesting sites. *B. lucorum* and *B. terrestris* were seen to nest in the banks of gunpit A nearby.

Hymenoptera-Parasitica. A few braconids, ichneumonids, cynipids, chalcids and on one occasion a number of tiny apterous proctotrupids of at least three species were trapped. One specimen of a fairy fly, a female **Mymar pulchellum* Curtis (Mymaridae) was found in July 1971. This species is relatively common in open plains but hardly anything is known of its life history.

Coleoptera. Beetles are the commonest victims of pitfall traps and a large number of species and individuals have been found. These are being determined by Mr D. G. Hall. In the collections made between 20 February and 9 May 1971 the dominant species was the carabid *Notiophilus biguttatus* (Fab.). A surprising absentee was *Abax parallelopipedus* (P. & M.) which is considered by some coleopterists to be a characteristic carabid of bracken areas on the edges of woods.

Other insects. Small numbers of Diptera and Hemiptera (mainly aphids) and a single sawfly (Hymenoptera) were noted, and there were some large moth larvae.

Crustacea

Only one woodlouse, *Philoscia muscorum* (Scopoli) (Isopoda: Oniscidae), was recorded. This species, which occurs in many habitats on the Commons, was first trapped in June.

Myriapoda-Diplopoda
Vermes-Oligochaeta

**Polydesmus gallicus* Latzel
**Tachypodoiulus niger* (Leach)
(Determined by Mr J. W. Coles.)
**Dendrobaena veneta* (Roca)
Enchytraedidae sp.

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Conservation Report 1972

by L. M. P. Small

By far the most important problem that has been before the Committee this year has been the threat to Staines Moor from gravel extraction. It is with great pleasure that we can now say that this application has been turned down by the Minister on the grounds that Staines Moor is an area of such ecological importance that, whilst gravel can be extracted elsewhere, it must remain undisturbed. Its importance for public recreation was also stressed. In this fight the naturalists, the Nature Conservancy, the Surrey County Council Planning Department, the Commons' Society and many other amenity bodies presented a united front and, we hope, set a pattern for future co-operation. Surrey County Council have stated that they believe the evidence given at the end of the enquiry by the naturalists Mr E. Milne-Redhead, Mr Reynolds and Mrs Small played a large part in the final rejection of the appeal to dig gravel. We are conscious, however, that we cannot rest on our laurels and that we must ensure that, should a new application come up in the future, we have all our information available in one place. We have therefore appointed a co-ordinator of records for Staines Moor in the person of Mrs S. Wenham, who played a most active part at the public enquiry. She will take over all the present records and accept all new ones sent to her of all groups. She is a botanist and visits the Moor regularly, adding a new record on the very day on which the naturalists were giving evidence.

The first meeting in January saw the appearance of Mr S. Crooks as the representative for the Hertfordshire and Middlesex Naturalists' Trust; thus we are at last fully in touch with all the Trusts in our area. Before the end of the year Mr Crooks had moved on to a conservation post elsewhere, but we were glad to welcome in his place Mr D. Shirley, the Trusts' Conservation officer.

In co-operation with Surrey Naturalists' Trust and the Surrey Bird Club the Committee has been called in to help the Civil Service Association to manage Littleton gravel-pit which they have just purchased. It is used for fishing and sailing and they are anxious to encourage and protect wildlife. A subcommittee has been set up with Mr Reynolds as convenor and Major Bruce Lowe as liaison officer and with Mrs Small acting for this Committee. A site meeting was followed by an indoor meeting and Mr Reynolds wrote offering such advice as was possible at this stage.

The idea of a Naturalists' Trust for the Greater London Council area has once again been informally discussed but has met with little encouragement. This Committee seems capable of acting for London on all matters which have so far occurred.

The Sites of Special Scientific Interest in the G.L.C. area have been under review during the year and the proposals are now in draft form. We hope that the final list may soon be ready.

Dutch elm disease has taken up quite a lot of time as London has been very hard hit. Hardly a park or common has escaped, and as there are many elms in these places it has been a heavy burden on local authorities to deal with it. Some authorities have noticeably lagged behind in their efforts.

A scheme to build a £1,000,000 Euro-centre at Old Slade, a reserve of the Berkshire, Buckinghamshire and Oxfordshire Trust near Iver, has been turned down, and we hope that this Trust will now find it possible to lease or buy this important site.

A threat to Essex marshes at Rainham by the dumping of rubbish by the G.L.C. has been opposed by the Essex Trust, and our members have helped with information about birds in the area.

A plan to build near Keston Common, with possible threats to the important boggy area has, after an appeal to the High Court on a legal matter, been referred once again to a public enquiry. Bromley Council will oppose it but, apart from expressing concern about any possible drainage, the Nature Conservancy do not consider we can make a good conservation case against it.

A suggestion that there might be a nature trail around the reservoirs at Walthamstow has been made and this is being investigated so that we may be certain that the birds remain undisturbed.

The Committee continues to receive many requests for help which it cannot give as the areas are primarily of amenity interest only. Often we are handicapped by lack of records. We appeal to all members working on specific groups or areas to let the Secretary or Chairman know so that we may keep a record of such information.

Botanical Records for 1971 and 1972

by J. Edward Lousley

In 1971 London again had a cold spring. Snow which fell on 25 April soon melted, but the following day was the coldest on record for late April in London. We had the wettest June since 1958 and an unsettled August, with more than two inches of rain on 4 August followed by a dry September. Although the year was a dry one in Britain generally, the rainfall reported at St James's, 24·92 inches, was above average. In 1972 spring was again late and it was not until August that we had good weather, and even then there were few really hot sunny days. But in spite of the damp, cloudy conditions, the rainfall from May onwards was below average, so that by autumn ponds and lakes had fallen to low levels. This encouraged exceptional displays of plants which thrive on exposed mud on pond margins and *Cyperus fuscus*, a very rare species, appeared in great quantity at its locality near Staines. On the other hand botanists who favour refuse tips had a poor season—they were too dry for plants to germinate. The rainfall for the year recorded at St James's was 437 mm, 73% of average.

The two years were noteworthy for steady, though rather patchy, progress rather than sensational finds. Several members contributed excellent lists of uncommon species from their own areas, with grid references, and valuable notes. Work of this kind is essential if the maps produced by the Plant Mapping Scheme are to be interpreted and put to full use, and more support would be welcome. In the last report (*Lond. Nat.* **50**: 113 (1972)) reference was made to the interesting discovery of *Vallisneria spiralis* in the Lea Navigation Canal near Cheshunt by Mr Stephen Harris with notes on its range from my own observations. Mr Harris tells me that Mr Trevor Lording was jointly responsible for the discovery and I very much regret that this was not known to me and hence his name was unfortunately omitted from my report. They are writing a full account to be offered to the editors of *Watsonia*.

In this report grid references are given in accordance with the Society's recording scheme (*Lond. Nat.* **51**: 20 (1972)). 'Tetrad' references are cited where available, and failing this 'centads', i.e. 10-kilometre squares of the national grid. In both cases these appear in brackets following the place names. The nomenclature is based on the *List of British Vascular Plants* (1958) prepared by J. E. Dandy, and for species in that list authors' names are omitted to save space.

V.C. 16, West Kent

R. M. Burton has supplied important lists, for both years, of plants in the vicinity of Eynsford with comments on their scarcity,

increase or decrease. One of the places where he found *Orobanche minor* was above the mouth of the railway tunnel (56/T46) which must be very near the locality, railway bank Eynsford, found by our member F. J. Hanbury over seventy years ago (Hanbury & Marshall, *Fl. Kent:* 267 (1899)). Our last record for *Ranunculus arvensis* from Kent was from Eynsford in 1920: Mr Burton found a plant at Farningham (56/T66) in the corner of a cornfield. *Ajuga chamaepitys* was plentiful in several places in 1972 outside our Area near Rochester: Mr Burton found it inside near Farningham (56/T64) and near Eynsford (56/T42). *Legousia hybrida* he found in abundance near Farningham (56/T64) and near Upper Austin Lodge (56/T42). Other interesting finds include *Prunus cerasifera* apparently bird-sown in Crockenhill Lane (56/T24); *Torilis nodosa* by the side of a lane to Newbarn, Eynsford (56/T24); *Luzula* x *borreri* in Farningham Wood (56); *Bromus thominii* near Farningham (56/T64) and *Avena ludoviciana* abundant in a cornfield near Lullingstone Castle (56/T24).

Another excellent list for both years was contributed by J. R. Palmer—this one with greater emphasis on aliens. His finds included seven small bushes of *Hippophae rhamnoides* in dried up marshland behind the sea-wall on Littlebrook Marshes (57/T66); *Hydrocharis morsus-ranae* in Dartford Marshes (57); and *Trifolium glomeratum* with *T. striatum* as lawn weeds at Sutton-at-Hone (56/T48), where they were probably introduced with top-soil or lawn seed. From Stone Marshes (57/T64) he reported *Bromus willdenowii* Kunth (*B. unioloides* Kunth) and *Myriophyllum verticillatum*, and *Potentilla argentea* from the Atlas Stone Company's pit (57). Greenhithe (57) produced *Carex distans* from behind the river-wall, our first record from Kent, *Puccinellia maritima*, *P. distans*, *P. pseudodistans*, and also *Barbarea verna* on waste ground. At Horns Cross (57/T64) he found one large plant of *Rumex triangulivalvis* in 1971, followed by a vast quantity in a sand-pit in 1972, and *Bromus inermis*, det. A. Melderis, was abundant in meadow grassland in 1971. A clump of *Festuca longifolia* was in a gravel-pit at Horns Cross (57) in 1972. Mr Palmer found several trees of *Salix acutifolia* at Horton Kirby (56/T68) and one plant of *Lagurus ovatus* on waste ground at Sutton-at-Hone (56/T68).

V.C. 17, Surrey

B. R. Radcliffe has contributed two welcome lists of plants he has found; most of these are from the Epsom to Banstead Heath district. From the steep sloping bank of a reservoir by the A307 at Surbiton (16/T66) he reports *Saxifraga granulata*. *Ceterach officinarum* he has from several places, including a wall at Headley Court (15/T84) and a wall at Epsom Cemetery (25/T08). In July 1972 I saw at the site of Croydon Airport (36/T02), a magnificent show of *Orobanche elatior*, which was first reported by the late Dr D. P. Young and the writer in 1960. On that visit we noticed a fine clump of *Cephalaria*

gigantea (Ledeb.) Bobrov—twelve years later there were two clumps growing likewise in rough grass. *Geranium pratense* occurs in many places as a native in our Area, but is also quickly established from gardens. Mrs L. M. P. Small noticed a particularly good example of this at Crystal Palace Cemetery (36/T48) where one patch covered an area of about fifty square feet. Elsewhere in the same Cemetery (36/T28) she found *Inula helenium*, and in a cornfield at Bletchingley *Chrysanthemum segetum*. *Veronica filiformis* has become common in a very few years but D. H. Kent's report of it from the river-wall just above Kew Bridge (17/T48) is of special interest as his many earlier records from the Thames banks in Middlesex suggest that it may be distributed by the river in such places.

During 1972 I made four visits to the Surrey Commercial Docks, Rotherhithe, and on two of them I was accompanied by Mrs L. M. P. Small. Their recent history is described by Grant in *Lond. Bird Rep.* **35:** 87 (1970), and I was hopeful that the enormous amount of timber imported before the docks were closed to shipping at the end of 1970 would have brought in seeds of foreign species attached to the bark. In this I was disappointed but they provided a considerable number of interesting records. Unfortunately four tetrads meet in the docks which complicates the work of recording. *Artemisia verlotorum*, *Euphorbia* x *uralensis* and *Bunias orientalis* occurred in three tetrads (37/T48, 37/T68, 38/T60); *Vicia tenuifolia*, *Rumex palustris*, *Juncus tenuis* (perhaps from North America on timber), *Carex ovalis*, *Poa angustifolia* and *Calamagrostis epigejos* in 37/T48; *Hirschfeldia incana* and *Sisymbrium loeselii* in 37/T68; *Medicago falcata* grew with *M. sativa* and their hybrid *M.* x *varia* in 38/T60.

At our only station for *Cirsium eriophorum* near Old Coulsdon (35/T06) there were on 16 July 1972 eighteen fine plants coming into flower. The importance of this plant is well-known to the appropriate officers of Croydon Corporation, who own the site, but shortly after my visit every plant was cut down by an employee mowing the field. It is especially unfortunate that accidents of this kind can still occur after all reasonable steps had been taken to protect this handsome plant.

V.C. 18, South Essex

We heard from Mr S. Harris that there was a fine display in 1972 of *Dactylorhiza incarnata* on open ground at Sewardstone (39/T68) with one plant of *D. praetermissa* and several hybrids between them. Since 1964 *D. praetermissa* has been known, with hybrids, on private ground not far away. J. H. Davidson contributed most helpful lists for both years, which filled many gaps, and revealed lengthy persistence for other species. For example *Solanum sarrachoides* was recorded from Rainham and Dagenham in 1927 and Mr Davidson had it from Rainham Tip (57/T28) in 1971, and it was still plentiful at Dagenham (58/T00) in the same year. I collected *Polygonum*

aubertii from East Ham tip in 1951, and Mr Davidson found it climbing a hawthorn tree there (48/T22) in 1971. Similarly at Bromley-by-Bow gas-works (38/T82), where Mr Davidson still finds *Bunias orientalis*, *Euphorbia* x *uralensis*, *Coronilla varia*, *Cardaminopsis arenosa* (now scarce) and other species I saw there with B. T. Ward in 1956, *Medicago falcata* was also found. *Cichorium intybus* has been known at the gas-works since 1938 and appears to be increasing, and *Sambucus ebulus* since the same year. On a visit to the Stratford Marsh locality for this plant (38/T64) with E. J. Clement and T. B. Ryves in October we found *Chenopodium anthelminticum* L. on an embankment of the River Lea.

V.C. 19, North Essex

Our only contribution was a list by S. T. Jermyn of the plants of part of the grounds of Waltham Abbey (30/T60) recently opened to the public. A grass he collected as an *Avena* has been named as *Macrochloa gigantea* (Link) Hack. by Dr A. Melderis, who says the specimens resemble forms from north Africa.

V.C. 20, Herts.

Only a few records were received.

V.C. 21, Middlesex

A surprising discovery was *Orobanche hederae* growing on *Hedera* in Highgate Cemetery (28/T86). This was found in 1972 by K. E. Bull and confirmed by D. H. Kent; our only other records are from Kew Gardens and the adjacent towpath for 1933-50 and 1948 respectively. *Orobanche minor* is much more common in the London Area, but an interesting locality was the Victoria Embankment Gardens (38/T00), where R. W. Jasper found it growing on 'tobacco plants' in the flower beds in 1970.

Azolla filiculoides has been known to us for more than twenty-five years in the Uxbridge district, but has been especially plentiful recently. Ian Johnson found it abundant in the River Colne at Springwell in 1970, and traced it to watercress beds where it was grown with other aquatics for sale (09/T42); after the subsequent floods he found it in 1971 all down the River Colne to Uxbridge (08/T44). D. H. Kent found it in October 1972 sparingly in the River Colne at Uxbridge Moor (08/T44); in great quantity from Denham Lock to near West Drayton in the Grand Union Canal, (08/T40, 08/T42, 08/T44, 08/T46); and locally plentiful in the Fray's River from near Denham Lock to Cowley (08/T40, 08/T42, 08/T44, 08/T46).

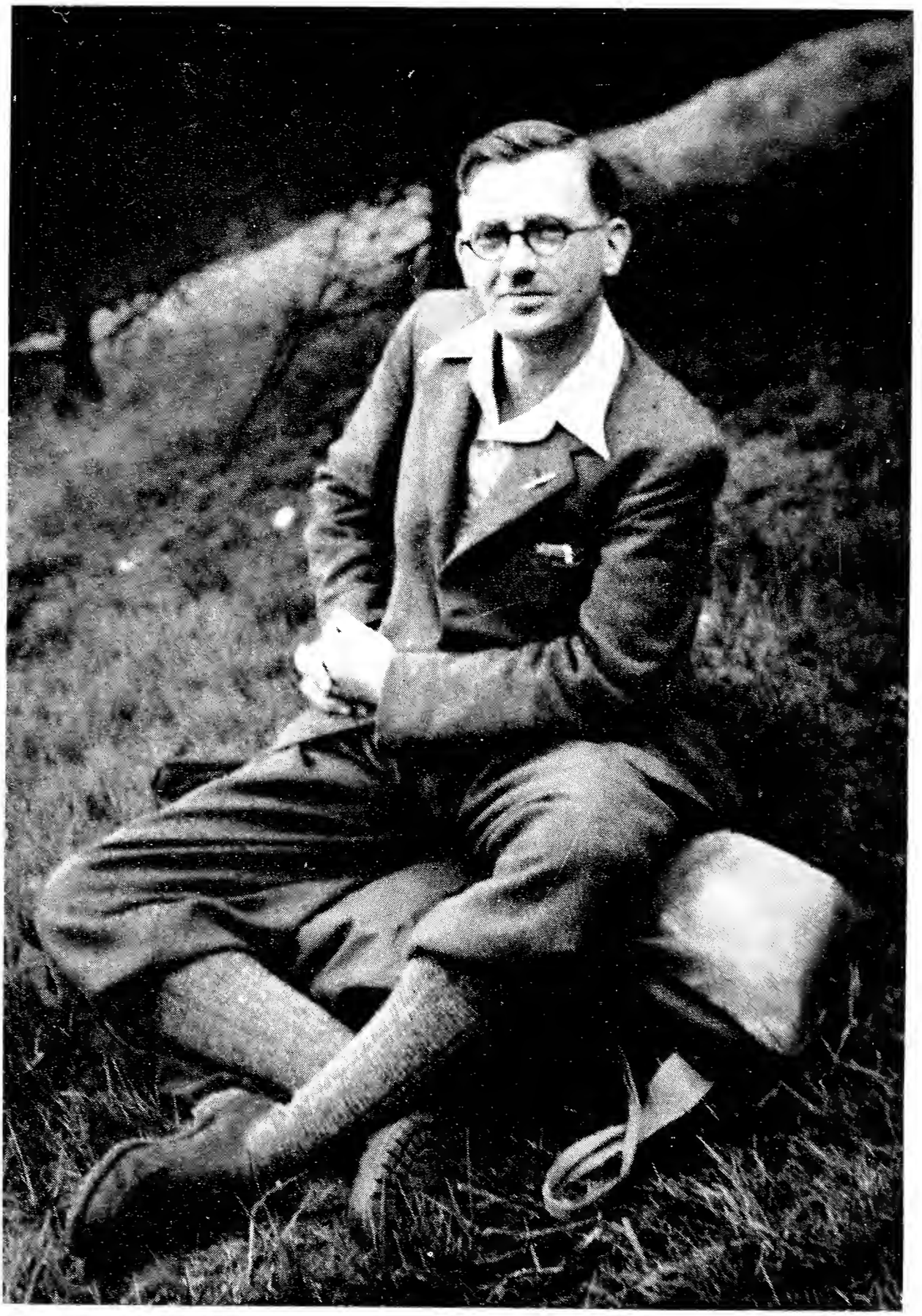
From a calcareous down near Harefield (09/T40) Ian Johnson reported about 100 plants of *Anacamptis pyramidalis* in 1970 and four plants of *Ophrys apifera*. From the canal path at Hanwell (17/T48)

W. Langham, comm. J. L. Gilbert, reported two plants of *Misopates orontium*. Two grasses, *Hordeum secalinum* and *Trisetum flavescens*, were found by R. M. Burton on a bank at the south-east corner of Hyde Park (27/T88), where they were probably introduced in turf. On the steps of a row of empty houses in Danvers Street, Chelsea, S.W.3 (27/T66), Miss E. Young found *Hirschfeldia incana*, which we have not had previously from central London.

V.C. 24, Bucks.

Hippuris vulgaris is reported from Rush Green, Denham (08/T24) by Ian Johnson in 1970.

We are grateful to the following for their contributions to our botanical records during 1971 and 1972: K. E. Bull, R. M. Burton, E. J. Clement, J. H. Davidson, Dr J. G. Dony, Mrs P. O. Dunkley, John L. Gilbert, Stephen Harris, Dr C. E. Hubbard, R. W. Jasper, S. T. Jermyn, Ian Johnson, Miss M. E. Kennedy, D. H. Kent, Arthur Lang, Mrs K. Lunnon, J. E. Lousley, D. McClintock, Dr A. Melderis, Ken Osborne, J. R. Palmer, B. R. Radcliffe, B. Ryves, Mrs L. M. P. Small, Dr C. West.



Cyril Castell at Box Hill in September 1938.

Obituaries

JOHN DENNIS CARTHY

In 1955, soon after Dr John Carthy joined the staff of Queen Mary College, he became a member of the Society, encouraged by our late Honorary President, Professor Munro Fox, who was an Emeritus Professor of the College. He quickly showed his interest in and willingness to help the Society, and in spite of his heavy commitments to many national bodies, never refused an invitation to lecture. Indeed he was due to do so in February 1972 when he was in fact in his last illness. His keen delight in nature, humour and charm came through in all he did, making him a well-liked personality on both radio and television. He wrote highly scientific books but knew too how to appeal to children, for whom he also wrote. His keen interest in nature conservation found him a place on many national committees, and when he became the first Scientific Director of the Field Studies Council he also took a place on the Council for Nature.

Through the death, at the comparatively early age of forty-eight, of this distinguished member just when his great promise was being realised and before his dream of a day centre for naturalists in Epping Forest had a chance to show its value, the Society, his friends, and natural history and conservation interests, have lost one who will not be easily replaced.

L. M. P. Small

CYRIL PHILIP CASTELL, 1907-1972

The death of Cyril Castell in his sleep on 25 February 1972 was a very great loss to the Society. In his quiet and unobtrusive manner he had exerted very considerable influence on the management of the Society's affairs for nearly forty years.

Cyril Castell was born in Wimbledon on 30 June 1907, the only child of a clockmaker, and he lived there all his life. After being educated at Rutlish School, Merton, he went on to further education in 1926, when he seemed set for a distinguished scientific career. However, shortly afterwards his father became incapacitated by a stroke, so that in order to support his parents, Cyril had to take a job in the Department of Geology in the British Museum (Natural History), in the Geology "Workshop", at 35 shillings a week. In his first appointment he was trained in plaster casting and modelling by F. O. Barlow, well known at that time in museum circles for his models of early man, assisting him to erect the skeleton of *Diplodocus*. Nowadays there is much of interest in the Department's laboratories requiring great scientific skill, but in Cyril Castell's time there was all too little scope for his active mind. However, on transfer to the Mollusca Section under Dr L. R. Cox, he found a rewarding task in

curating the vast national collection, which included several thousand drawers of fossils, and which became his life's work until retirement in 1967. Nevertheless he was determined to complete his education, and found time to attend the Chelsea Polytechnic evening courses, working in his leisure hours at geology and botany. Although he duly obtained the University of London B. Sc. Special Botany degree in July 1940 he continued with these classes for another four years. During the War, seconded to the Geological Survey, he prepared pamphlets on water supplies from underground sources in southern England, and also shared the fire-watching duties on various museum roofs during the bombing raids. In the nineteen fifties he was made Senior Experimental Officer and placed in charge of British Caenozoic Mollusca. Professionally he will always be remembered for the meticulous work he put into the preparation of the fossil handbooks, the best-selling of all the Department's publications, his wide knowledge of natural history and of taxonomy ensuring their popularity and accuracy. When the great London Clay geologist A. G. Wrigley died while preparing the first of these handbooks, on *British Caenozoic Fossils*, only about 60 of the fossil drawings had been completed. Cyril Castell took over the preparation of all three handbooks, which have become essential for any scientific library and have been in such demand that new editions were required. *British Caenozoic Fossils* appeared in 1960, *British Mesozoic Fossils* in 1962, and *British Palaeozoic Fossils* in 1964.

It has been the writer's privilege to have known Cyril as a close friend for over forty years. His enthusiasm for natural history dominated his life, inspired no doubt by his father who was also interested. His great relaxation was in classical music, either playing the piano or enjoying his stereo records, but he was also a great reader of detective stories. In addition to his professional skills, C. P. Castell had wide natural history interests, being one of the few really good general naturalists in the Society. A very fine memory enabled him to reveal a knowledge of almost any branch, and be became expert in several, notably geology, palaeontology, conchology, botany and ecology. A man of genuine humility, such was his diffident and almost apologetic response to a question that newcomers have even been misled into thinking him a beginner, but they very soon realised the remarkable depth of his knowledge. In committee he was likewise diffident and self-critical, but after listening carefully for some time he always made a valuable contribution. His great flair for criticism made his opinion on natural history writings very valuable, although his perfectionist tendencies were perhaps sometimes too extreme and occasionally made him reluctant to publish or even finish an article. He was inclined to be pessimistic, but not deeply so, and this did not prevent him from persevering and completing his task. At any time, however despondent, he showed flashes of a very good sense of humour which was never far below the surface and indeed

made him excellent company, and his conversation was always interesting. He was most generous, particularly with his time which he gave freely to all who asked for advice on identification and other matters, and he must have devoted a great many evenings to lectures and committee work for numerous natural history bodies in connection with their research, publications, organisation, and conservation affairs. His industry was enormous; he attempted to index everything he possessed, including a vast accumulation of specimens and notes.

Ever since he joined in 1932 Cyril Castell was always willing to undertake tasks for this Society, and these were invariably completed with great attention to detail. It is hardly surprising therefore that he was persuaded to serve in so many responsible positions, becoming President in the centenary year (1958) and in 1959. His address on the occasion of the centenary celebrations meeting, "The Society's first sixty years", was an important contribution to our history. At the two annual general meetings he gave presidential addresses which involved valuable research into London's natural history, "The climate and vegetation of the London Area in prehistoric times" and "The animal life of prehistoric London", both published in *The London Naturalist*. He was Vice-president from 1960 until 1968, when he was elected Honorary Vice-president in recognition of his many services to the Society. He served as Honorary Secretary in 1956, and on the Council in various capacities from 1943 until his death. He was Secretary of the Ecology Section from 1945 for 13 years, and Secretary of the Geology Section in 1945, later Chairman 1951-56, in 1951 also working as Honorary Recorder for Geological Reserves. In addition he served on many sectional and other committees, and was Recorder for Mollusca for 20 years.

From the early days of the War he was a moving spirit in nature conservation, and soon became a member of the Nature Reserves Investigation Subcommittee, being appointed Secretary in 1944. He continued to hold that office until 1956, through changes in name to Nature Reserves Committee in 1946 and later to the Nature Conservation Committee. He again became Secretary when the Committee was reconstituted in 1959, until in 1962 he was elected Vice-chairman, which he remained until incapacitated by illness in 1967. During this long period he wrote many reports on the progress of conservation in London, and these have been extremely valuable as a foundation for subsequent work. Indeed, a list of over 150 potential nature reserves in the London Area, prepared in connection with the Greater London Plan, later formed the basis of the London sites when the Nature Conservancy was formed in 1949. At his death, the L.N.H.S. Council decided that the annual meeting of the London Nature Conservation Committee be henceforth known as the Castell Memorial Lecture in recognition of his services to conservation.

His leanings towards ecology were perhaps best demonstrated by his interest in surveys. As early as 1937 he took an active part in the Limpsfield Common Survey, and much later, in the nineteen fifties he inspired a ten year study of the regeneration of the flora of an area of Headley Heath denuded during the War. However it was the Bookham Common Survey which became the outstanding object of his quiet but sustained enthusiasm. At the start in 1941 he took a large part in the organisation of the Survey and soon became the accepted leader, later officially designated Director. He had plenty of sound ideas about lines of inquiry and conservation work, and many of these have borne fruit. The base map he produced is still in use today. He kept the Survey very much alive and active until his illness, and even then continued to give expert advice on it up to the time of his death. He wrote wholly or partly at least twelve papers on the Survey, and a large part of each of 25 annual progress reports, his main field work being on the vegetation and geology. When in 1964 the Society erected a hut near the Keeper's cottage with the kind permission of the National Trust, the name Castell Research Centre was given to it. As a sustained amateur survey continuing for over thirty years this project is perhaps unique in this country. The detailed record of the Common and the changes occurring there have considerably increased the knowledge of these habitats. The Society owes Cyril Castell a great debt of gratitude for his persistent effort.

Although specialising in fossil Mollusca, C. P. Castell was keenly interested in living species of molluscs and was Honorary Secretary of the Conchological Society of Great Britain and Ireland from 1952 to 1959, becoming President (1960-1962). He gave two presidential addresses, "Some notes on London's molluscs" and "The contribution of Kennard and Woodward to the history of British non-marine Mollusca". He served also on the Council of the Malacological Society from 1949 to 1952 and was a member of many societies including the Geological Society of London, the Geologists' Association and the Tertiary Research Group. He worked on Mollusca collected during a number of archaelogical excavations. In addition he was for many years Recorder for Hepatics (liverworts) for the British Bryological Society, and Honorary Secretary of the Wimbledon Natural History Society (1933-1939) and a council member of the British Empire Naturalists' Association (1930 to 1948). His published work totals 120 or more titles. It is pleasing to find that his contributions to conchology were recognised by the naming of a fossil freshwater bivalve in his honour, *Unio castelli* Woodward.

C. P. Castell retired in June 1967 after 40 years at the Museum, but a mere five months later he was suddenly struck down with paralysis of his right arm and leg, although fortunately his mental faculties were in no way impaired. As if this great disability was not enough, a fractured right femur was followed by an operation for

gall-stones. He had remained a bachelor and had lived with his mother for many years; she died only a few months before him aged ninety-three. However in spite of all his disabilities Cyril managed to live on his own for his last months, greatly helped by kind neighbours and friends. In spite of much discomfort and many lonely hours he showed great determination, fortitude and courage, keeping his mind alert and ready to discuss problems and advise. He learned to write quite well with his left hand, and even managed to produce a paper on Bookham vegetation and to start on a list of bryophytes, although working one-handed (and that his left) and moving only with great effort must have enormously magnified his task. Nevertheless during the inevitable periods of frustration and depression he could be easily cheered by his sense of humour, which never left him. His many friends feel a keen sense of loss at his passing. He generously bequeathed almost the whole of his estate to the London Natural History Society.

The writer is most grateful to those who have supplied information for this article, especially Ella Hillman, Margaret Kennedy, Richard Butler, John Cooper, R. W. Hale, Albert Reeley and Harry A. Toombs.

GEOFFREY BEVEN

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1948. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **1:** 115-117.

1949. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **1:** 212-214.

1949. How to begin the study of mosses and liverworts. *Countryside* II, **15:** 7-14, 1 fig.

1949. The survey of Bookham Common. Seventh year. Progress report. *Lond. Nat.* **28:** 45-6.

1949. The fungi of Bookham Common. A supplementary list. *Lond. Nat.* **28:** 47-50.

1949. BANGERTER, E. B. & CASTELL, C. P. Notes on the vegetation of the gun-pits and trenches on Eastern Plain, Bookham Common. *Lond. Nat.* **28:** 52-56, 1 map.

1949. (Review) Sea-shore Life of Britain. By L. R. Brightwell. *Lond. Nat.* **28:** 121.

1950. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **1:** 374-380.

1950. The survey of Bookham Common. Eighth year. Progress report. *Lond. Nat.* **29:** 89-90.

1950. (Review). A Key to the British Fresh- and Brackish-Water Gastropods, with Notes on their Ecology. By T. T. Macan. *Lond. Nat.* **29:** 137.

1951. A new name for *Segmentina micromphala* (Sandberger). *J. Conch. Lond.* **23:** 169.

1951. An introduction to liverworts. *Countryside* II, **16:** 67-70, 1 text-fig.

1951. The leafy liverworts. *Countryside* II, **16:** 146-9, 1 text-fig.

1951. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **1:** 491-496.

1951. The survey of Bookham Common. Ninth year. Progress report. *Lond. Nat.* **30:** 41-42.

1951. BANGERTER, E. B. & CASTELL, C. P. Further notes on the vegetation of the gun-pits in Eastern Plain, Bookham Common. *Lond. Nat.* **30:** 54-56.

1952. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **2:** 89-97.

1952. The survey of Bookham Common. Tenth year. Progress report. *Lond. Nat.* **31:** 33-34.

1952. The study of fossil pollen. *Countryside* II, **16:** 182-184.

1952. LONGFIELD, C. & CASTELL, C. P. Archaeology Section report. *Lond. Nat.* **31:** 102-103.

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1953. The survey of Bookham Common. Eleventh year. Progress report. *Lond. Nat.* **32:** 45-47.

1953. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **2:** 297-304.

1954. REELEY, A. & CASTELL, C. P. *Index to the Proceedings of the Geologists' Association. Vols. 51-60: 1940-1949.* 34 pp. Benham & Co., Colchester.

1954. Post-war progress in nature conservation in the London Area. *Lond. Nat.* **33:** 6-20.

1954. The survey of Bookham Common. Twelfth year. Progress report. *Lond. Nat.* **33:** 23-25. (In part.)

1954. BROWN, M. M. & CASTELL, C. P. The London City of Oxshott, Surrey. *Lond. Nat.* **33:** 61-64.

1954. (Review). The Natural History of the City. By R. S. R. Fitter and J. E. Lousley. *Lond. Nat.* **33:** 149.

1954. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **2:** 471-477.

1955. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **2:** 578-582.

1955. The survey of Bookham Common. Thirteenth year. Progress report. *Lond. Nat.* **34:** 13-16. (In part.)

1955. The bomb-crater ponds of Bookham Common. *Lond. Nat.* **34:** 16-21, 2 photographs, 1 map.

1955. The beetles of the gun-pits (1945-1946) compiled from the MS notes of the late L. G. Payne. *Lond. Nat.* **34:** 21-22.

1955. BROWN, M. M. & CASTELL, C. P. Additions to the London Clay fauna of Oxshott. *Lond. Nat.* **34:** 46-48.

1955. Post-war progress in nature conservation. Corrections and additions. *Lond. Nat.* **34:** 145-147.

1955. The Mollusca (pp. 290-296) *in* Warren, S.H. The Clacton (Essex) Channel Deposits. *Q. Jl geol. Soc. Lond.* **111:** 283-307.

1956. Survey of Bookham Common. Fourteenth year. Progress report. *Lond. Nat.* **35:** 9-12. (In part.)

1956. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **3:** 146-150.

1957. The survey of Bookham Common. Fifteenth year. Progress report. *Lond. Nat.* **36:** 50-51. (In part.)

1957. Obituary of J. F. Bensley, 1894-1955. *J. Conch. Lond.* **24:** 213-214.

1957. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **3:** 322-326.

1958. The Society's first sixty years. *Lond. Nat.* **37:** 2-8.

1958. The survey of Bookham Common. Sixteenth year. Progress report. *Lond. Nat.* **37:** 56-58. (In part.)

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1958. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **3:** 461-470.

1959. Climate and vegetation of the London Area in prehistoric times. *Lond. Nat.* **38:** 6-16.

1959. The survey of Bookham Common. Seventeenth year. Progress report. *Lond. Nat.* **38:** 57-60. (In part.)

1959. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **3:** 626-630.

1960. The animal life of prehistoric London. *Lond. Nat.* **39:** 5-16.

1960. The survey of Bookham Common. Eighteenth year. Progress report. *Lond. Nat.* **39:** 63-65. (In part.)

1960. (1959) (Compiler). *British Caenozoic Fossils.* British Museum (Natural History), London.

1960. New vice-county records. Hepaticae. *Trans. Br. bryol. Soc.* **3:** 763-769.

1961. The survey of Bookham Common. Nineteenth year. Progress report. *Lond. Nat.* **40:** 71-73. (In part.)

1961. HILLMAN, E. M. & CASTELL, C. P. Headley Heath survey. A ten-year study of the re-colonization by plants of denuded heathland. *Lond. Nat.* **40:** 91-101.

1961. JONES, A. W. & CASTELL, C. P. Some notes on the snails and slugs of Devilsden Wood and the nearby downs, Coulsdon. *Lond. Nat.* **40:** 131-136.

1961. Report on Mollusca *in* Fell, C.I. Shenbarrow Hill Camp, Stanton, Glos. *Trans. Bristol and Glos. archaeol. Soc.* **80:** 40-41.

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1962. (Compiler) *British Mesozoic Fossils.* British Museum (Natural History), London.

1962. Some notes on London's molluscs. *J. Conch. Lond.* **25:** 97-117.

1963. Report on Mollusca *in* Turner, D. J. Excavations at Merton Priory, Merton, Surrey. *Lond. Nat.* **42:** 91-92.

1963. The survey of Bookham Common; Twenty-first year. Progress report for 1962. *Lond. Nat.* **42:** 93-97. (In part.)

1963. Appendix V: Land Mollusca *in* Manby T. G. The excavation of the Willerby Wold Long Barrow, East Riding of Yorkshire. *Proc. Prehist. Soc.* **29:** 204.

1964. Survey of Bookham Common. Twenty-second year. Progress report for 1963. *Lond. Nat.* **43:** 83-85. (In part.)

1964. Mollusca. *Sussex archaeol. Colln* **102:** 140.

1964. (Compiler) *British Palaeozoic Fossils.* British Museum (Natural History), London.

1964. The non-marine Mollusca *in* Ovey, C. D. (ed.) The Swanscombe Skull, a survey of research on a Pleistocene site. *Occ. Pap. R. Anthrop. Inst.* **20:** 77-83.

1965. Survey of Bookham Common. Twenty-third year. Progress report for 1963. *Lond. Nat.* **44:** 111-114. (In part.)

1965. Notes on the geology and soils of Bookham Common. *Lond. Nat.* **44:** 114-125, 7 figs.

1966. Survey of Bookham Common. Twenty-fourth year. Progress report for 1965. *Lond. Nat.* **45:** 51-55. (In part.)

1966. Mollusca from Green Low chambered tomb. *Derbysh. archaeol. J.* **85:** 24.

1967. Survey of Bookham Common. Twenty-fifth year. Progress report for 1966. *Lond. Nat.* **46:** 110-116. (In part.)

1967. CASTELL, C. P. & COOPER, J. Report on Mollusca *in* Turner, D. J. Excavations near Merton Priory 1962-3. *Surrey archaeol. Colln* **64:** 66-70.

1968. Survey of Bookham Common. Twenty-sixth year. Progress report for 1967. *Lond. Nat.* **47:** 87-94. (In part.)

1970. Survey of Bookham Common. Twenty-eighth year. Progress report for 1969. *Lond. Nat.* **49:** 93-104. (In part.)

1970. COOPER, J. & CASTELL, C. P. Report on the contents (crude mechanical analysis and Mollusca) *in* Turner, D. J. Wooden water pipe at Ravensbury Park, Mitcham. *Surrey archaeol. Colln* **67:** 58-59.

1970. (Review) A Key to the British Fresh- and Brackish-water Gastropods, by T. T. Macan. Third edition. *Lond. Nat.* **49:** 133.

1972. CASTELL, C. P. (the late) & COOPER, J. Report on the Mollusca from Hay Wood rock shelter, near Weston-super-Mare, Somerset *in* Everton, A. & R. Hay Wood Cave burials. *Proc. speleol. Soc.* **13:** 4-40.

DALLAS FAWDRY, 1932-1972

The death of Miss Dallas W. Fawdry in March 1972 came as a great shock to her many friends in the Society and particularly to the Botany Section, for which she was the Indoor Meetings Programme Secretary. Dallas, born on 20 July 1932, was educated at Portsmouth High School and at St Hugh's College, Oxford, where she graduated with an honours degree in English. She had a flair for journalism with a marked ability for the presentation of technical subjects. In 1959 she was appointed editor of the journal *Dairy Engineering* and, when this journal amalgamated with *Dairy Industries* in 1964, she took over the combined editorship, the position she held until her death.

Dallas was widely known in the dairy trade both in this country and abroad where, moving very much in a man's world, she was recognised and respected as a person of exceptional ability. The editorship of one of the world's leading technical journals in the dairy industry, coupled with an extensive knowledge of the countryside, enabled her to be equally at home in the company of either farmer or technician.

As a naturalist, Dallas played a prominent part in several societies in addition to the London Natural History Society. She was a council member of the Botanical Society of the British Isles and had served on several committees. She was a member of the Wild Flower Society where she dealt with all the advertisements for their magazine. In her home county she was an active member of the Hampshire Naturalists' Society.

With a number of us who admired her unbounded energy and had the privilege of sharing her enthusiasm for plant hunting, there will ever remain a vivid and cherished memory of Dallas on a windswept headland above Scourie in the far north in Scotland, or forging ahead of a party high on the Sow of Atholl.

T. G. COLLETT

JAMES GRAHAM HARVEY

It was with great sorrow that in April 1972 we learned of the death of J. Graham Harvey. Graham was a great bibliophil and his offer to help with the library in some modest way led to his appointment as Librarian when Mr J. B. Foster retired in 1960. He did not serve for long, but it was a hard and difficult time. After packing up the library for the redecoration of the basement of 25 Eccleston Square, he started to rearrange it on the shelves only to hear that the library must be moved as the Royal Society for the Protection of Birds (the landlords) were going to Sandy. He did most of the hard work of packing again before the move to Queen Mary College, and he tried to work there under great difficulties and in spite of the long journey. He continued with this work until once again it was pack up

and go, and the move to Ealing Central Library took place. He stayed on the Library Committee for some time but the journey from Croydon was such that he could not continue. Those who worked with him will remember the smooth and efficient manner in which the operations were organized and the perfection of his parcel packing. Graham was never a fast worker, but he was meticulous in everything he did and he never spared himself.

Like many others, Graham came to the Society via Morley College, where for several years he attended natural history and other courses, and played an active part in College affairs. Even before joining the Society he and his wife, Ella, contributed many useful records of mammal distribution in south London, and, after moving to Croydon, he painstakingly chronicled the observations they made on the local foxes—a most important contribution to the Society's fox survey.

Many of us, and especially the writers, will mourn the loss of a kind, true and generous friend.

L. M. P. Small and W. G. Teagle

Books

British Wild Flowers. By John Hutchinson. 2 vols. 947 pages. David & Charles, Newton Abbot. 1972. £3.50.

These two attractively produced volumes comprise the first hard back edition of John Hutchinson's well-known works on British wild flowers which were previously available as Pelican paperbacks, published 1945-50. The book deals with 809 species of plants, which are only a selection of the British flora. Each species is described in detail and illustrated by a line drawing which includes enlargements of key features. The drawings are skillfully executed but sometimes fail to capture the character of the plant (e.g. *Anthyllis vulneraria*).

Any work which attempts to give such detailed attention to each species must inevitably compromise in the selection of species for inclusion. I feel it is quite justified to leave out the grasses (as they are dealt with elsewhere) and to devote little space to the less popular groups such as pondweeds and sedges. However, I consider it most misleading to illustrate only some of the possible species without stating in the description the number of other closely related species that might occur in Britain. Anyone who finds a cornsalad in south-west England will identify it as *Valerianella locusta* using this book, and will remain blissfully unaware of the existence of *V. carinata* which is the common species in that region. It is easy to find fault with any selection made by someone else, but I think the revision of this book presented an opportunity which was not taken to remove some of the plants (e.g. *Bupleurum rotundifolium* and *Arnoseris minima*) which have become virtually extinct since the book was first produced, and replace them with species which have become more frequent (e.g. the alien *Bupleurum lancifolium*).

In making an assessment of any book one should take into account the stated aim of the author. In this instance "It was compiled specially for those who have little or no knowledge of botany, but want to learn the names and something about the wild flowers of the countryside." In view of this I feel that much more space should have been devoted to details of the ecology and distribution of each plant, and perhaps a little less to a lengthy description of morphological details.

The beginner to botany will do better with one of the cheaper and more comprehensive illustrated guides to our flora, at least as a first book. I would recommend this book to the botanist who requires more detailed descriptions of our species, and who appreciates the convenience of having both the illustrations and text together on each page for ease of reference.

J. L. Mason

A Revised Key to the Adults of the British Species of Ephemeroptera with Notes on their Ecology. By D. E. Kimmins. 75 pages, 30 text figs. Freshwater Biological Association, Ambleside. Scientific Publication **15.** 1972. Second revised edition. £0.60.

This new edition of Kimmins's useful booklet has only a few changes from the first edition. In spite of the addition of *Baetis digitatus* Bengt. the checklist of British species now numbers 47 instead of 48. The key to the families has been amplified, and the nomenclature has been brought up-to-date. The ecological notes have been split up and spread through the body of the keys.

Very little attention has been given in recent years to the mayflies of the London Area and they would repay study. The nymphs of the ubiquitous *Cloeon dipterum* which used to turn up in the wartime static tanks are frequently met with in garden ponds in the suburbs. A few years ago when I was working in a government building in Whitehall I was surprised on two occasions to find adult mayflies on high window sills having been carried by the wind from, presumably, the River Thames.

A. E. Le Gros

A Key to the Larvae, Pupae and Adults of the British Species of Elminthidae. By D. G. Holland. 58 pages, 29 text figs, 11 maps. Freshwater Biological Association, Ambleside. Scientific Publication **26.** 1972. £0.40.

The Elminthidae are a small group of beetles that inhabit running water and have in the past been included in the Parnidae. Although these beetles are to be found in fast-flowing streams they cannot swim but cling to stones and logs with considerable tenacity by means of their powerful claws. They crawl out at night to take flight. They are, therefore, an excellent example of an insect adapting itself to a seemingly impossible habitat.

Eleven species have been recorded in Britain but only four may be said to be common. *Macronychus quadrituberculatus* Müller is now considered to be extinct in this country and two have only been recorded from single localities.

The publication is more than a simple key as, additionally, it includes information on the systematics, methods of collecting, life-histories, checklist, bibliography and distribution maps of the species. These maps are based on those used for the *Atlas of the British Flora* and can be used with the transparent overlays issued with that work. The publication is well illustrated and users of the keys should have no difficulty in identifying their specimens.

D. G. Hall

Statement of Affairs

31.10.71				
	The Hindson Bequest			
14,539	Balance at 1 November 1971		26,403	
11,266	Add: Amount received in current year ...		–	
598	Interest on investment		707	
26,403				27,110
	The Castell Bequest			
–	Received during current year		22,000	
–	Interest on investments		93	22,093
	Accumulated Fund			
47	Balance at 1 November 1971 (deficit) ...		(125)	
(172)	Transfer from general account (deficit) ...		(167)	
(125)				(292)
	Premises Fund			
2,123	Balance at 1 November 1971		2,293	
170	Add: Interest for year		183	
2,293			2,476	
–	Less: Grant to general account		398	
2,293				2,078
	Life Composition Account			
270	Balance at 1 November 1971		240	
30	Less: Transfer to general account		40	
240				200
	Library Cataloguing Fund			
200	Balance at 1 November 1971			200
	Ornithological Research Fund			
175	Balance at 1 November 1971		159	
9	Add: Interest for year		5	
184			164	
25	Less: Grant to atlas scheme		–	
159				164
	Other Reserves			
95	*Lond. Nat.* **49** add. reserve		–	
850	*Lond. Nat.* **50** reserve		–	
–	*Lond. Nat.* **51** reserve		850	
650	*Lond. Bird Rep.* **35** reserve		–	
–	*Lond. Bird Rep.* **36** reserve		750	
225	Programme		–	
100	Honoraria		–	
200	Plant Mapping Scheme publication ...		225	
2,120				1,825
31,290				£53,378

at 31 October 1972

31.10.71				
	The Hindson Bequest Investments			
10,000	Quoted investments at cost	10,000		
11,966	Bank Deposit Account	12,318		
4,437	Central Investment Company	4,792		
26,403				27,110
	The Castell Bequest Investments			
–	United Dominion Trust			22,093
	Current Assets			
402	Balance at Bank: Current Account... ...	447		
1,509	Deposit Account... ...	514		
2,976	Central Investment Company	3,214		
4,887				4,175
31,290				£53,378

Report of the auditors to the members of
The London Natural History Society

We have verified the accounts with the books and records of the Society and certify them to be in accordance therewith.

Knightway House,
20 Soho Square,
LONDON, W1V 6QJ

1 December 1972

NORTON KEEN & CO.
Chartered Accountants

General

31.10.71	Payments	
223	Hire of halls etc	363
143	Sectional expenses including L.N.C.C.	224
34	Subs. to other societies	59
57	Printing and stationery	61
55	Library	78
34	Castell Research Centre	12
150	Honoraria	350
86	Postage and telephone	119
14	Sundries	37
–	Castell bequest expenses	162
–	Purchase of addressograph machine	398
83	Cost of services (auditors' fees, bank charges, insurance)...	43
34	Advertising Society	–
2,157	Grant to publications account	1,839
3,070		3,745
	Transfers to reserves:	
100	Honoraria	–
25	Plant Mapping Scheme research and publication fund ...	25
3,195		£3,770

Publications

192	Programme	277
225	Programme reserve (expenditure equals reserve)	–
157	*Lond. Nat.* **50** (excess expenditure over reserve)	–
95	*Lond. Nat.* **49** (expenditure equals reserve)...	–
850	*Lond. Nat.* **51** reserve	850
201	*Lond. Bird Rep.* **35** (excess expenditure over reserve) (£772—£650) ...	122
650	*Lond. Bird Rep.* **36** reserve	750
–	*Bulletin*	197
2,370		£2,196

Account

31.10.71		Receipts			
2,478	Subscriptions— current			2,618	
28	arrears			22	
73	advance			45	
42	entrance fees			43	
				2,728	
2,621					46
73	Donations				168
160	Tax recovered from deeds of covenant				24
66	Deposit Account interest (Nat. Westminster Bank Ltd.)				55
50	Deposit Account (Central Inv. Co.) Ex. Premises Fund				14
–	Sundries including bird film receipts				–
23	Refund of E.C.Y. expenses				40
30	Transfer from Life Composition account				100
–	Honoraria reserve				398
–	Premises fund				30
–	Castell bequest—sale of records				167
172	Excess of payments over receipts (transferred to accumulated fund)				
3,195					£3,770

Account

213	Sale of publications	235
–	Bulletin income	15
–	Sale of reprints etc.	7
2,157	Transfer from general account	1,839
–	*Lond. Nat.* **50** (excess reserve over expenditure) (£850—£749.98)	100
2,370		£2,196

Index to The London Naturalist 32-51 (1953-1972)

by R. M. BURTON and ELLA M. HILLMAN

No index has appeared in any of the journals of the London Natural History Society since 1953, when *The London Naturalist* **32** contained an index by R. S. R. Fitter of all its journals to date. In this attempt to meet part at least of the deficiency, we have been greatly indebted to two men, neither of whom was aware of the help they were giving us: to Mr Fitter himself, whose work, so much more monumental than ours, presented a clear example of how to deal with many of our problem entries; and to C. F. Sayers. Some years ago Mr Sayers prepared a combined index to *The London Naturalist* and *The London Bird Report*, in continuance of Mr Fitter's; he recast it as each new issue appeared while publication was under consideration; then when a few details of his text were still in question, the final draft was mislaid. Meanwhile a new *London Naturalist* editorial committee had been formed, which decided that work on a new index should start. When Mr Sayers' draft came to light again, it was found very useful in verifying our own.

In the alphabetical author index below, the dates given are the actual date of publication. The figures in bold type are the issue number; those after the colon are the page numbers in the issue. Items of anonymous authorship have not been included in the alphabetical list, but appear in the subject index which follows.

Author Index

—— See also Brown, M. M. & Castell, C. P.; Hillman, E. M. & Castell, C. P.; Jones, A. W. & Castell, C. P.
—— & JONES, A. W. 1958. Notes on the vegetation of Eastern Plain. **37:** 58-65, 3 pl.

CHALKE, S. H. 1954. Vertical zonation of some species of birds in oakwood (Eastern Wood, Bookham Common). **33:** 47-51.

COCKSEDGE, W. C. 1954. Feasts and feastings in olden days. **33:** 73-79.
—— 1955. Mr Pepys dines. **34:** 37-42.
—— 1958. Some reminiscences of the City. **37:** 50-54.

COLLENETTE, C. L. 1958. The North London Society in 1907. **37:** 8-9.

COOPER, JOHN. 1963. The Ecology Section's collection: appeal for specimens. **42:** 58.
—— See also Rundle, Adrian J. & Cooper, John.

CRAWSHAW, K. R. 1963. The work of an extra-metropolitan county trust in Essex. **42:** 106-108.

CRUDASS, JOHN, & MEADOWS, BRIAN. 1965. Report on the natural history of the Lea valley. **44:** 151-156.

CURRIE, P. W. E. 1969. A preliminary list of sawflies on Bookham Common. **48:** 142-149.

DAVIS, R. A. 1956. Small mammals caught near London. **35:** 88-89.

DAWSON, E. J. 1972. Conservation report 1971. **51:** 81-82.

DE WORMS, C. G. M. 1954-5-6-7-8. The moths of London and its surroundings. **33:** 101-146. **34:** 66-107. **35:** 33-76. **36:** 59-99. **37:** 136-178.
—— 1959, 1960. A supplement to the butterflies and moths of London and its surroundings. **38:** 33-50; **39:** 99-129.
—— 1962. A review of the Lepidoptera of the London Area for 1960 and 1961. **41:** 60-65.
—— 1964. A review of the macrolepidoptera of the London Area for 1962 and 1963. **43:** 26-33.
—— 1965. An analysis of the macrolepidoptera recorded from the garden of Buckingham Palace. **44:** 77-81.
—— 1966. A review of the macrolepidoptera of the London Area for 1964 and 1965. **45:** 89-97.
—— 1969. Résumé of the macrolepidoptera of the London Area for 1966 and 1967. **48:** 121-124.
—— 1970. A review of the macrolepidoptera of the London Area for 1968 and 1969. **49:** 82-89.
—— 1972. A review of the macrolepidoptera of the London Area for 1970 and 1971. **51:** 28-38.

DIVER, C. 1958. The role of the amateur naturalist. **37:** 17-22.

DONY, J. G. 1959. Some Hertfordshire plant records. **38:** 74-76.

EASTON, A. M. 1964. A further visit to Moulsey Hurst. **43:** 24-25.

FELTON, J. C. 1967. Notes on the Hymenoptera of the Bushy Park area, Middlesex. **46:** 105-109.

FITTER, R. S. R. 1953. Contributions to the bibliography of the natural history of the London Area. 2. A subject index of the society's journals, 1914-1951. **32:** 94-113.
—— 1960. Further records of mammals, reptiles and Amphibia in the London Area. **39:** 18-21.

FRANKS, J. Pollen analysis of peat from the Oaken Trough (section 8) at East Ham Sewage Works. See Banks, Caroline (1962).

GOLD, K. A. J. 1967. Small mammal trapping at Bookham Common. **46:** 126-129.

ING, BRUCE. 1962a. The Conservation Corps at Bookham. **41:** 74-76.
—— 1962b. The Conservation Corps in the London Area. **41:** 89-92.
—— 1964. An unusual Myxomycete in the London Area. **43:** 16-17, 1 pl.
—— 1965. A hand list of the plants of the London Area. Myxomycetes. **44:** 30-42.

JACKSON, ALAN C. 1965. The macrolepidoptera of the South Herts. plateau. Some selected records and an appeal to members. **44:** 73-76.

JONES, A. W. 1954a. The flora of Bookham Common. **33:** 25-47.
—— 1954b. Notes on the drone-flies (Syrphidae, Diptera) of Wimbledon Common. **33:** 83-88.
—— 1955a. Notes of the butterflies of Wimbledon Common. **34:** 108-114.
—— 1955b. The flora of the golf course on Wimbledon Common. **34:** 141-145.
—— 1955c. Drone-fly visitors to the flowers on the City bombed sites. **34:** 154-157.
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Subject Index

Archaeology

Buried rivers of London: Butler (1962).
Carshalton: supposed Iron Age earthwork etc.: Turner (1962); Mesolithic finds etc. at Orchard Hill: Turner (1966).
Merton Priory, excavations at: Turner (1963, 1965).
Roman roads: Stane Street at Morden: Turner (1959, 1960); road from Dunmow to London: Bignell (1964).
Southwark and Lambeth, various excavations in: Turner (1965).

Bookham Common survey progress reports

A report in this series has appeared annually in every issue, and it has not proved practicable to include these reports in the general indexes. Each one includes material on several subjects, by different authors, and the contributions vary greatly in length and importance. We have excluded items consisting only of a statement that work has been done, without details; also left out are a few brief reports the content of which has been repeated later in a more comprehensive paper dealt with by the main index. The overall paging of the reports indexed is **32:** 45-48. **33:** 23-25. **34:** 13-16. **35:** 9-12. **36:** 50-51. **37:** 56-58. **38:** 57-60. **39:** 63-65. **40:** 71-73. **41:** 72-74. **42:** 93-97. **43:** 83-85. **44:** 111-114. **45:** 50-55. **46:** 110-116. **47:** 87-94. **48:** 126-134. **49:** 93-104. **50:** 98-108. **51:** 39-44.

Much of this ground has been covered previously by Beven, to whom we are indebted. His bibliography of published papers on Bookham Common up to 1967 is in **47:** 99-102.

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Bangerter, E. B. Botany
Bensley, C. J. F. Mollusca
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Castell, C. P. all sections
Coles, J. W. Zoology
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Currie, P. W. E. Hymenoptera
Groves, E. W. Insects
Hancock, M. F. Fungi
Hillman, E. M. Botany
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Laundon, J. R. Lichens
Le Gros, A. E. Algae. Zoology
Meadows, B. S. Fishes
Parmenter, L. E. Insects
Reeves, F. C. Vegetation
Ruttledge, W. Orthoptera
Sandford, H. A. Carnegie Grant
Towns, M. Zoology
Ward, M. F. see Hancock

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Eastern Plain: Castell **49,** Hillman **49, 50.**
Grassland and scrub: Castell **35, 39, 42, 49,** Hillman **49, 50.**
Under dense hawthorn: Castell **42.**
Water and wet places: Castell **42, 44,** Hillman **51,** Jones **32.**
Willows of Eastern Plain: Bangerter **32.**

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- Hertfordshire: Dony (1959).
- Kent. Horns Cross chalkpit: Side (1967).
- London area: Kent & Lousley (1951-57); Lousley (1953 . . . 1972).
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- Surrey. Bookham Common: Jones (1954a, 1959, 1960). Dulwich Woods: Lousley (1959b, 1960a). East Sheen Common: Welch (1963). Ham Common: Welch (1962). Hurst Park race-course: Smith & Welch (1963). Moulsey Hurst: Easton (1964). Petersham Common: Welch (1961). Wimbledon Common golf course: Jones (1955b).

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Ecology

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  Grassland with thick scrub, feeding sites of birds: Beven (1964).
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  Race-course, Hurst Park, plants of: Smith & Welch (1963).
Habitats in the London area: Peterken (1953).
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  Brent Reservoir, bird life: Batten (1972).
  Epping Forest ponds, dispersal and succession of plants in: Selby (1955).
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  Lake in St. James's Parks: Pentelow (1965); Algae in: Whitton (1966); phytoplankton of: Whitton (1966).
  Snails in aquatic habitats at Ruislip: Seel (1964).
Prehistoric vegetation: Castell (1959). Environmental factors in history: Rose (1957)
Reconnaissance surveys of vegetation: Sandford (1968a).
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  Oakwood, sessile, relics at Dulwich: Lousley (1959b, 1960a).

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East Ham, remains of wild ox, and pollen analysis: Banks (1962)
Epping Forest: ferns: Payne (1960); plants in ponds: Selby (1955).
Lea Valley: report: Crudass & Meadows (1965); return of fishes to River Lea: Meadows (1970).

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Kent (v.c. 16)
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Horns Cross, *Pyrola rotundifolia* at: Side (1967).
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Woolwich area, animal life: Rigden (1955).

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Former land levels: Woodley (1961).
Holocene Mollusca: at Chiswick Eyot: Simons (1964); at Plumstead Marshes: Shillitoe (1959).
London Clay: at Oxshott: Brown & Castell (1954, 1955), Hampton (1957), Rundle & Cooper (1970b); temporary exposures: Rundle & Cooper (1970a).
Looking into the past: Butler (1970).
Marble and serpentine, collection of specimens: Butler (1958, 1959).
Musk-ox records: Simons (1962).
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Prehistoric animal life: Castell (1960).
Prehistoric climate and vegetation: Castell (1959).
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St James's Park lake: Pentelow (1965).
Thames in London, changing level of: Woodley (1961).

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Centenary exhibition, 1958: Vernon (1959).
Collections: **43**: 9.
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Index to the journals 1914-51: Fitter (1953).
Library, periodicals held (1967): **46**: 152-158. Lists of additions to the library appear in **34-40**, **42-46**, 48 and **49**.
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Reports of Council, statements of account, etc. appear in each issue and have not been indexed.
The "London Area"; its history and future use: Lousley (1965a).
The role of the amateur naturalist: Diver (1958).
The Society 1858-1957: Castell (1958), Collenette (1958), Parmenter (1958a), Tremayne (1958).
The Society's rules (1972): **51**: 88-95.
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Climate in prehistoric times: Castell (1959).

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Records of small mammals near London: Davis (1956). Further records of mammals: Fitter (1960). Report for 1960, with 1957-59 records: Teagle (1963a). 1961: Teagle (1962, 1964a). 1962: Teagle (1965). 1963-64: Burton (1966a). 1965: Burton (1967). 1966: Beames (1968a). 1967: Beames (1969). 1970: Towns (1972a).
Species and groups:
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Bats: observations in east Surrey, and records for the London Area: Hancock (1963); in the London Area: Beames (1968b).
Fox in the suburbs: Teagle (1967).
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Harvest mouse in the London Area: Teagle (1964b).
Hedgehog: behaviour in a garden: Rook (1959); in London: Morris (1966).
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Holocene Mollusca: from Chiswick Eyot: Simons (1964); from Plumstead Marshes: Shillitoe (1959).
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Water-snails at Ruislip: Seel (1964).

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Distribution in the Area: Yalden (1965). Records for the London Area: Fitter (1960). Records 1965-66: Yalden (1967).

Master Grid Overlay

by H. A. SANDFORD

This has been drawn to be used with the revised recording map of the London Area. If this overlay is placed over a distribution map one can read off the location of any symbol showing the presence of a plant or animal. If the distribution is plotted for tetrads then each tetrad symbol will appear in the centre of a tetrad square on the overlay. Each tetrad contains four monads and if the distribution is plotted for monads then each monad symbol will appear in the appropriate corner of a tetrad square on the overlay. A full description of recording maps and overlays appeared in *Lond. Nat.* **51**: 20-21 (1972).

Overlays may be kept in the pocket in the back cover of *Lond. Nat.* **51** (1972).

Instructions to Contributors

Submission of papers

Papers relevant to the natural history and archaeology of the London Area should be submitted to the editor, Mr J. R. Laundon, Department of Botany, British Museum (Natural History), Cromwell Road, London SW7 5BD, before the end of January if they are to be considered for publication in the same year. They should be typed, with double spacing and wide (three cm) margins, on one side of the paper. Authors must retain a duplicate copy. Papers should include an abstract, summary or synopsis.

Text

Spellings are to follow *Chambers Twentieth Century Dictionary*; locality spellings should follow the latest editions of the maps published by the Ordnance Survey. Capitalisation should be kept to a minimum. Common names of animals and plants must begin with lower-case initials, and scientific names must be underlined. Genus names should appear in full where first used within each paragraph. In descriptive matter numbers under 10 should be in words, except in a strictly numerical context. Dates should follow the logical sequence of day, month, year (i.e. 25 December 1971). Measurements should be in metric and follow the SI system (Système International d'Unités), with imperial equivalents in parenthesis where appropriate. There should be no full point following Dr, Mr, Mrs or St. Lists should be in natural, alphabetical or numerical order.

References

Reference citation should be based on the Madison rules (in *Bull. Torrey bot. Club* **22** : 130-132 (1895)) except that a colon should always precede a page number. Capitalisation in titles of papers in journals should be kept to a minimum. Journal titles should follow the abbreviations in the *World List of Scientific Periodicals* and be underlined. Examples are as follows:

In text:
Meadows (1970 : 80). (Meadows 1970).

In references:
MEADOWS, B. S. 1970. Observations on the return of fishes to a polluted tributary of the River Thames 1964-9. *Lond. Nat.* **49** : 76-81.
MELLANBY, K. 1970. *Pesticides and Pollution.* Ed. 2. Collins, London.
WHITE, K. G. 1959. Dimsdale Hall moat, part II. *Trans. a. Rep. N. Staffs. Fld Club* **92** : 39-45.

Illustrations

Distribution maps should be submitted in the form of a Recording Map with symbols in Indian ink or Letraset. Solid dots are used to indicate contemporary or recent presence, circles for old records and crosses (not pluses) for other information, such as introduced species. Tetrad dots and circles should be 4·0 mm and tetrad crosses 5·0 mm, with a line thickness of 0·8 mm; all monad symbols should be 1·6 mm with a line thickness of 0·5 mm. The legend should be written outside the frame of the map and will be set up by the printer. The Mapping Schemes Secretary can provide Recording Maps, advice and dyes for printing distribution symbols.

Line drawings should be in Indian ink on Bristol board, preferably twice the printed size. Place names, etc., must be produced with stencils or Letraset. Legends should be separate as they will be set up by the printer.

Photographs should be glossy black-and-white prints, of good contrast, preferably half-plate in size.

Proofs

Galley proofs will be sent to authors for scrutiny, but only essential corrections can be made at that stage.

Reprints

Up to twenty-five free reprints will be supplied on request. Additional copies may be purchased if ordered when the proofs are returned.

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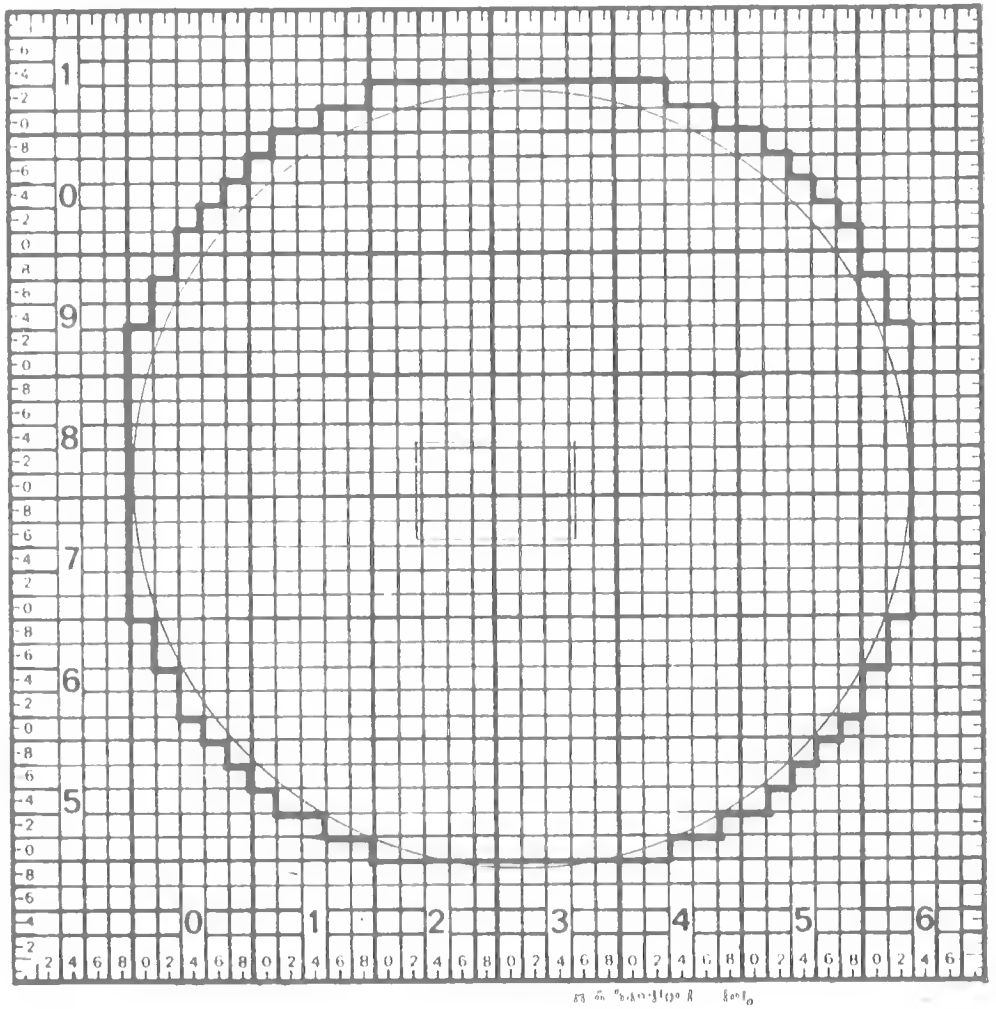
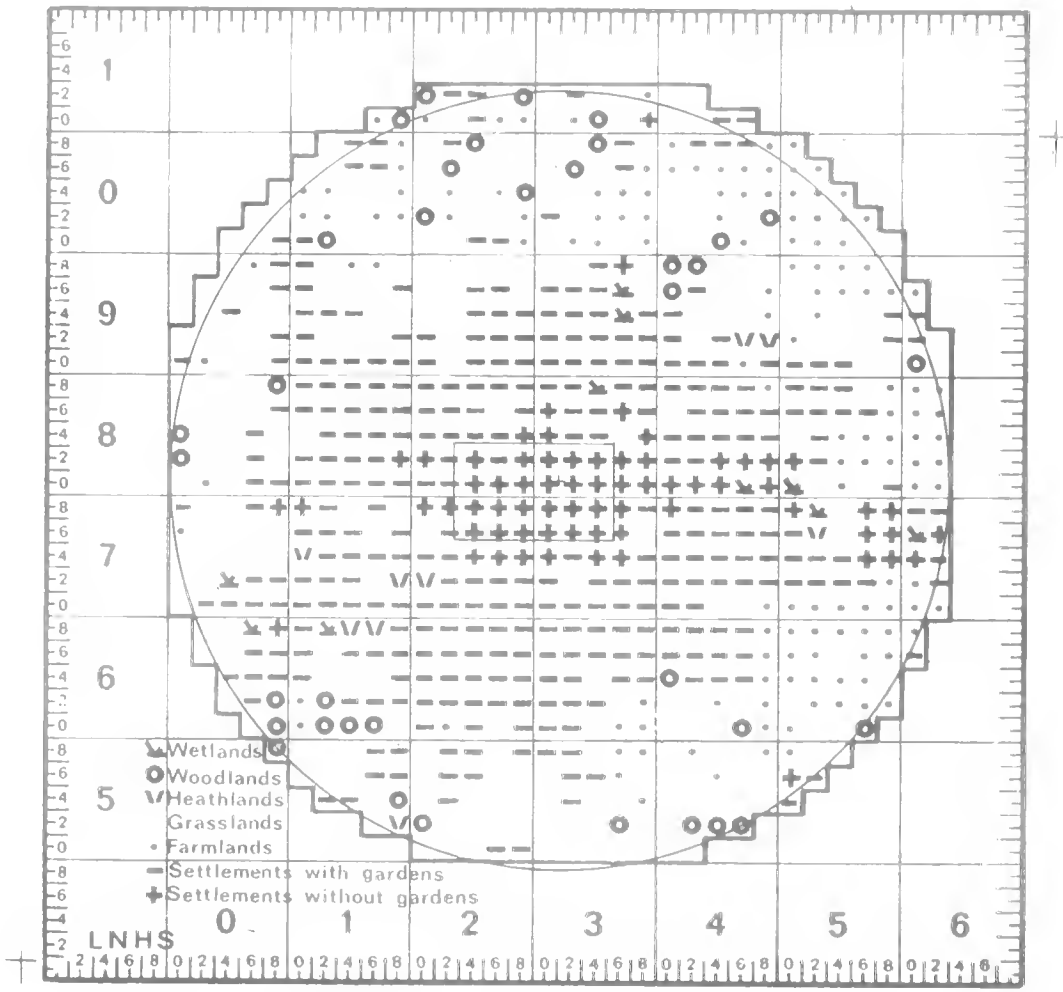
MASTER GRID



MASTER GRID

HABITAT



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Based with permission, upon the Second Land Utilisation Survey.

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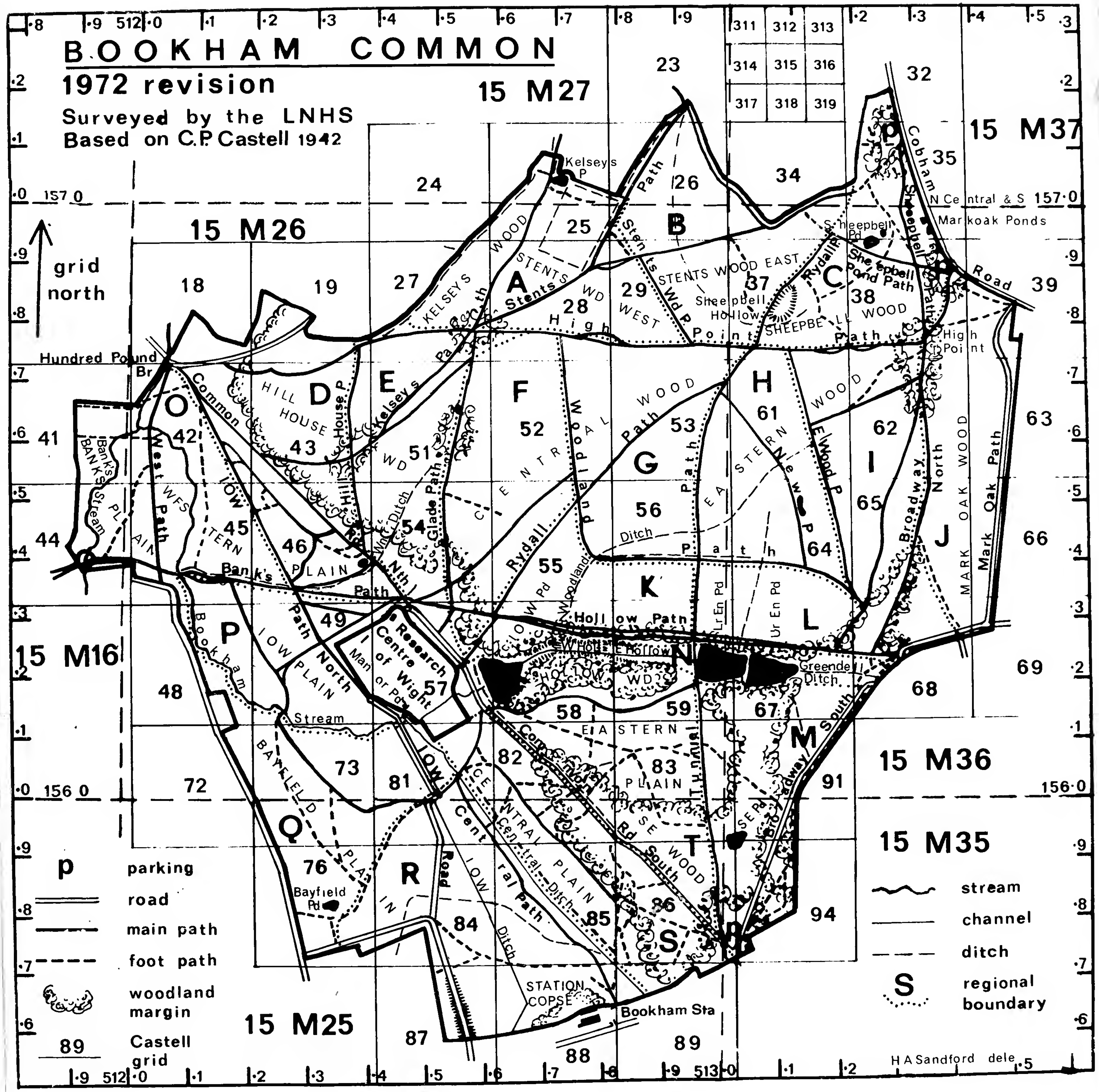
BOOKHAM COMMON
1972 revision
Surveyed by the LNHS
Based on C.P. Castell 1942
15 M27
15 M37
15 M26
15 M16
15 M36
15 M35
15 M25
grid north
Hundred Pound Br
Kelseys P
Markoak Ponds
Sheepbell Pd
Cobham Road
Sheepbell Pond Path
Stents Wood East
Sheepbell Hollow
High Point
Banks Stream
Banks Plain
West Path
WFS
Common Road
Hill House Wd
Kelseys Path
Central Wd
Woodland Path
Rydall Path
Eastern Wd
New Path
Elm Wood P
Broadway
North Oak Wood
Mark Oak Path
Hollow Path
Hollow Wd
Greendell Ditch
Manor Pd
Research Centre of Wight
Bookham
Stream
Bayfield Plain
Bayfield Pd
North Plain
Central Path
Central Plain
Central Ditch
Eastern Plain
South Wood
Tunnel
Station Copse
Bookham Sta
H A Sandford dele
p parking
road
main path
foot path
woodland margin
89 Castell grid
stream
channel
ditch
S regional boundary